CANADA'S FERTILE NORTHLAND

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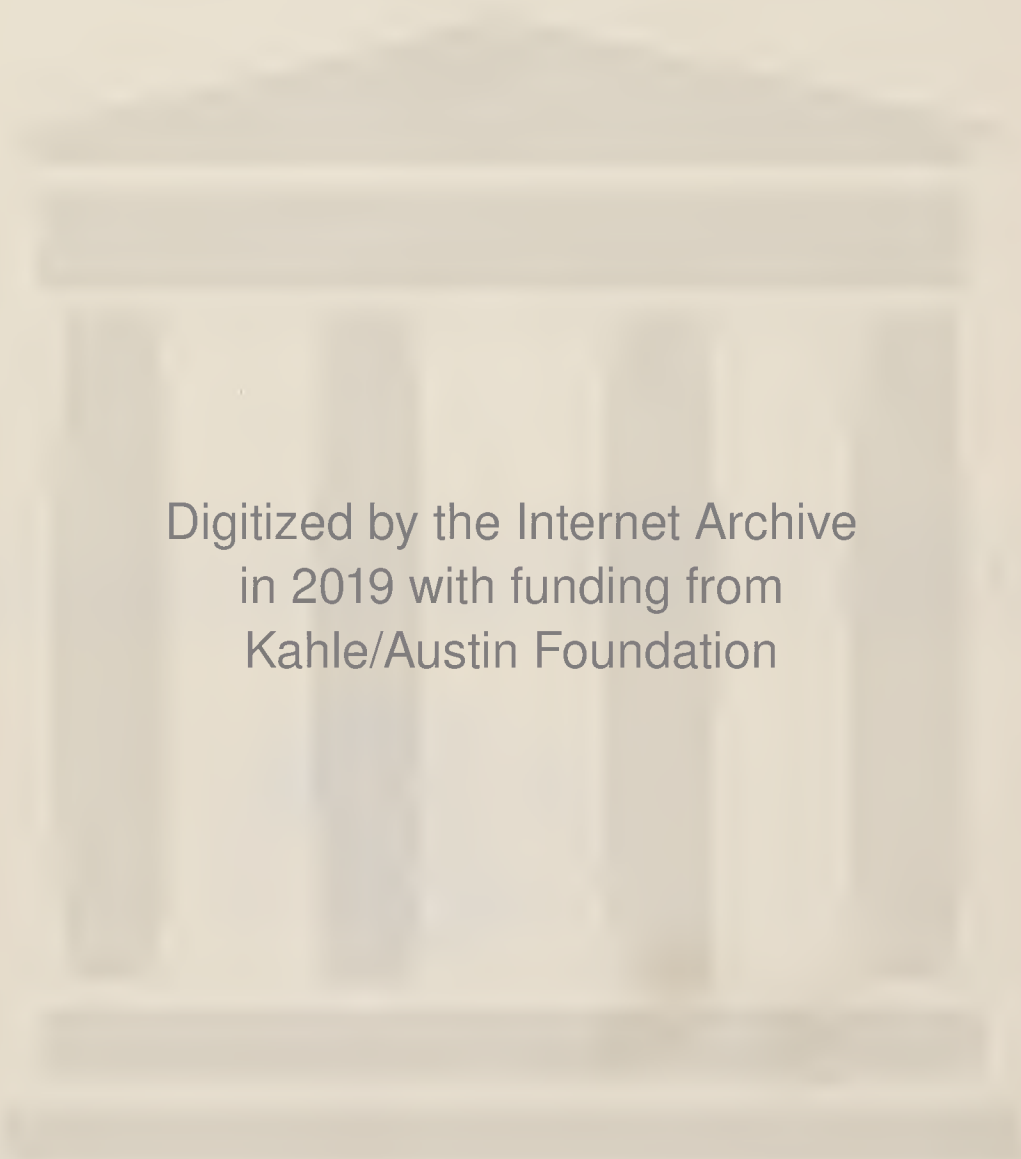

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CANADA'S FERTILE NORTHLAND

A GLIMPSE OF THE ENORMOUS RESOURCES OF PART OF THE UNEXPLORED REGIONS OF THE DOMINION

EVIDENCE

HEARD BEFORE A SELECT COMMITTEE OF THE SENATE OF CANADA DURING THE PARLIAMENTARY SESSION OF 1906-7, AND THE REPORT BASED THEREON

EDITED BY

Captain Ernest J. Chambers

Gentleman Usher of the Black Rod

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Hon. Frank Oliver, Minister

OTTAWA
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(Illustrations at end of volume.)

INTRODUCTION

After a few more years inflow of immigration at the present rate, Canada's future expansion as an agricultural, lumbering, mining and industrial country will depend upon the exploitation of the natural resources of the Dominion's vast, unexplored northland.

Within this designation may be classed the northern portions of the provinces of Quebec, Ontario, Saskatchewan, Alberta and British Columbia, the Yukon Territory and those vast regions known as the Northwest Territories.

This volume does not deal with the undeveloped natural wealth of the whole of Canada's unexploited northland, however, but only with that of those parts of the new provinces of Saskatchewan and Alberta which lie north of the Saskatchewan watershed; of Ungava, which lies north of the province of Quebec; of Keewatin, which lies north of the provinces of Ontario and Manitoba; and of Mackenzie, which lies north of the provinces of Saskatchewan and Alberta, and east of the Yukon Territory.

This represents an area fairly stupendous in its extent.

The area of those portions of Alberta and Saskatchewan lying north of the Saskatchewan watershed may be set down at 250,000 square miles. Ungava has a total area of 354,961 square miles; Keewatin, 470,416; Mackenzie, 562,182; total, 1,637,559 square miles. This is by more than 300,000 square miles twice the combined area of the four original provinces of confederation, namely, Ontario, Quebec, Nova Scotia and New Brunswick. It is exactly 272,673 square miles greater than the combined area of the seven older provinces and of those portions of the two new provinces of Saskatchewan and Alberta, which lie south of the Saskatchewan watershed.

The great northland appears, at last, to be on the eve of exploitation.

The trend of settlement in Canada, and also in the United States, has been westward, following the construction of railways. As the land in the railway belts (the more southern part of western Canada) is being rapidly filled up, as the older railway lines throw out their feeders northward, and as the location and construction of the new National Transcontinental railway proceeds, attention is being rapidly attracted to the great northern reserves.

Mr. R. E. Young, of the Department of Interior, in 1905, prepared a statement showing that the enormous inflow of immigrants and settlers would in a reasonable time exhaust the available lands for free homesteads in the present settled portions of the western provinces and calling attention to the possibilities of the practically unexplored hinterland of Canada.

Mr. Young also had a map of the northern portion of Canada prepared which contained all available information from any source regarding the possibilities and resources of the country. As a result of Mr. Young's investigations the matter was brought to the attention of the Hon. Thos. Davis, Senator from Prince Albert, Saskatchewan, who moved for the appointment of a select committee to inquire and report from time to time as to the resources and value of that part of the Dominion lying north of the Saskatchewan watershed, east of the Rocky Mountains and west of Hudson Bay, comprising the northern parts of the provinces of Alberta and Saskatchewan and the Mackenzie territory. On account of the session being somewhat advanced, the motion was withdrawn at the request of the leader of the House, who promised that the subject should receive favourable consideration at the following.

Consequently, on January 24, 1907, the Hon. Mr. Davis again presented his motion. The honourable gentleman in doing so explained that very little is known of the country north of the Saskatchewan. Although he had lived in the Saskatchewan

valley 27 years and had travelled a good deal, he was getting new information every day as to the resources of the northern country.

Senator Davis spoke of the good which had resulted from the investigation into the resources of the then far northwest by the Schultz committee of the Senate in 1887, but explained that it was possible in 1907 to elicit much more valuable information than was available 20 years ago. He explained how the opening up of the Yukon had led adventurous spirits into the great intervening northland, where they attempted to locate a route overland from Edmonton into the Yukon. Several of these men never reached the Yukon, but had lived for five or six years in the country south and east of that territory, and had discovered wonderful natural resources. The experience of these men was worth obtaining. Other evidence, too, he believed, was available to prove to the world that Mackenzie territory and the hinterland of the two new provinces possess vast resources in minerals, arable and grazing lands, timber areas and fisheries.

The Honourable the Secretary of State explained that the government fully concurred in Senator Davis' motion and that he personally felt that it was of the highest importance to give greater publicity to the advantages and resources of northern Canada.

The Right Honourable Sir Richard Cartwright remarked:—'There is no doubt we are hardly acquainted in the slightest degree with the enormous resources of the unexplored regions of this Dominion. We have barely scratched the surface, and yet we have found such places as the well-known Cobalt camp, the Klondike, and other sections, where there are enormous resources of which we never dreamed.'

A very interesting debate followed, participated in also by the Hon. Messrs. Power, Watson, Gibson, G. W. Ross, Ferguson, P.C., Belique, Douglas, Domville and Robertson.

At the suggestion of the Hon. Messrs. Casgrain and Ferguson, the motion was amended to bring Ungava and Keewatin within the scope of the proposed investigation, and, as amended, the motion of Senator Davis was adopted.

The select committee originally consisted of Hon. Messrs. Talbot, Lougheed, Douglas, DeVeber, Landry, Tessier, Wilson, McMullen, Young, Ferguson, J. H. Ross, McGregor, Power, Robertson, Watson, Bernier Kirchhoffer, Ellis, Thompson, Perley, Bostock, Domville, G. W. Ross and the mover. By resolution of the Senate of February 7, 1907, the names of the following were added to the committee:—Honourable Senators Roy, Legris, McDonald (Cape Breton) and McSweeney.

At the first meeting of the committee the Honourable Senator Davis was elected chairman, and on February 21, the Senate adopted a report of the select committee empowering it to send for persons, papers and records.

The hearing of evidence was soon thereafter proceeded with and continued from day to day during the session. The evidence was taken in shorthand, and in accordance with a resolution moved by the Hon. Senator Power, seconded by the Hon. Senator Ferguson, was transferred to the undersigned for condensation and revision.

The select committee practically completed its work on March 30, 1907, when, on motion of the Hon. Mr. Ellis, the Hon. D. Ferguson, P.C., took the chair and the following resolution, moved by the Hon. Mr. Ellis, seconded by the Hon. Mr. Perley, was carried unanimously:—

'That the thanks of the committee be tendered to the Hon. Mr. Davis for the able,

efficient and impartial manner in which he has managed the meetings and work of the committee.

'That this resolution be entered upon the printed report.'

In the evidence heard before the select committee of the Senate some striking facts stand out prominently, among them the following:—

Ungava possesses a belt of iron-bearing rock, probably 100 miles long and 200 to 300 miles wide, and in the future Labrador peninsula will furnish a large supply of our iron. (Evidence of Mr. A. P. Low.)

In the region north of Lake Winnipeg there is an area of from 5,000 to 10,000 square miles of country adapted to agriculture.

No less an authority than a member of the Alberta legislature who lived many years in that country, estimated the area of available agricultural lands in Mackenzie and northern Alberta at not less than one hundred million acres. (Evidence of W. F. Breden.)

At a point some 400 miles due north of Edmonton splendid crops of wheat, barley, oats, peas, &c., have been regularly raised for over 20 years, the product for the season of 1906 being 25,000 bushels. That the production of grain in these northern, sparsely settled regions has already resulted in the establishment of local grist mills of considerable capacity which manufacture flour by modern processes.

Potatoes and other vegetables have been for many years satisfactorily cultivated at Fort Good Hope, on the Mackenzie river, fourten miles from the Arctic circle.

The isothermal lines west of Hudson bay trend almost due north instead of east and west as popularly supposed.

Vegetation matures wonderfully quickly in northern latitudes owing to the very long days during the season of growth.

The accompanying report submitted by the select committee to the Senate, and adopted by that honourable body, and the eivdence as revised and published with the report show in detail exactly what the committee accomplished.

It might perhaps be explained that in the editing of the evidence care has been taken, having due regard to brevity, to conciseness, to the avoidance of needless repetition, and to other obvious considerations, to preserve the style, and, as far as possible, the actual expressions of the witnesses.

The select committee's report, and the evidence, appear in the following pages in exactly the same form in which they were published in the appendix to the Senate Journals.

ERNEST J. CHAMBERS.

The Senate,

Ottawa, October 1, 1907.

REPORT OF THE SENATE COMMITTEE

THE SENATE,
COMMITTEE ROOM No. 8,
TUESDAY, 16th April, 1907.

The Select Committee appointed to inquire and report from time to time as to the value of that portion of the Dominion lying north of the Saskatchewan watershed, and east of the Rocky mountains, comprising the northern parts of the province of Alberta and Saskatchewan, and the Mackenzie Territory, and the extent of navigable waters, rivers, lakes and sea coast contained therein; and also to similarly inquire and report from time to time as to the value of the portions of the Dominion west and east of Hudson bay including the Territories of Keewatin and Ungava, and the extent of navigable waters, rivers, lakes and sea coast contained therein have the honour to submit their third report as follows:—

Your Committee in accordance with the authority delegated to it, sent for persons, papers and records bearing upon the subjects submitted for its consideration, and examined a number of gentlemen possessing special knowledge, through personal experience or otherwise, of the regions named as the special subject of inquiry.

It was decided before proceeding to the hearing of evidence, to, as far as possible, conduct the examination of witnesses according to a modern system, and a schedule of subjects, in the following order, was decided upon:—

1. Agriculture.
2. Forestry.
3. Fisheries.
4. Minerals.
5. Climate.
6. Settlements.
7. Means of communication.

The inquiry was not entirely confined to these subjects, much important information being obtained as to the geographical and physical features of the regions in question, the game to be found therein, the fur trade, &c.; but the preceding schedule served its purpose broadly, as a guide in the conduct of the inquiry.

The shorthand report of the evidence thus obtained is submitted herewith and your Committee has the honour to recommend that after the said report of the evidence has been carefully edited, and to some extent condensed, the evidence being transposed from the form of questions and answers into that of direct narration, it be printed.

Your Committee desires to acknowledge the courtesy of all those gentlemen who have given oral evidence or in any other way assisted in the work of this inquiry.

Your Committee has the honour to very briefly draw attention to some of the important information regarding the resources of the Dominion's vast reserves of territory in the northeast and northwest obtained as a result of their investigations.

TERRITORY OF UNGAVA.

As to the Territory of Ungava, in the far northeast of the Dominion, the evidence given before your Committee tends to show that although there is some fairly good soil in the middle of the Labrador peninsula, and although vegetables are successfully grown at East Main River, Hamilton Inlet and other places, the climate is considered too cold for successful agriculture. The principal forest areas of the Labrador peninsula (and they appear to be extensive and very valuable) are in the province of Quebec, but in Ungava the forest wealth, apart from large quantities of pulpwood, is confined almost wholly to the river valleys and the edges of the lakes. There are numerous magnificent water-powers, while the fisheries both inland and coast, but particularly the former, are susceptible of extensive development. Attention was particularly drawn in the evidence to the necessity of providing for the protection of the walrus in the Hudson bay and strait, as owing to the present wasteful method of conducting the walrus fishery industry three out of every four walruses killed are lost.

The mineral wealth of Ungava was shown to include lead, copper, mica, asbestos and iron. Southeast of Ungava bay a belt of iron-bearing rock probably 100 miles long and 200 to 300 miles wide was described, and the opinion expressed that in the future Labrador will furnish a large supply of our iron.

The fur-bearing animals of Ungava would appear to constitute a valuable asset of the Dominion, the evidence taken by your Committee tending to show that the best skins in the world, including marten, foxes, otters, mink, black bear and white bear, are obtained in Labrador.

Attention was drawn in the evidence to the deterrent effect upon the development of the country, particularly in connection with the great forest areas in the vicinity of Hamilton Inlet, of the uncertainty as to the exact extent of the jurisdiction of the Colony of Newfoundland from the Atlantic coast inland. Your Committee would respectfully draw the attention of the members of the government in this House to this subject.

As to the vast region west of Hudson bay and James bay, it appears most natural to consider it in two divisions, one comprising the Territory of Keewatin, immediately bordering upon the great sheets of water just named; the second division extending from the western boundary of Keewatin to the Rocky mountains, and including the northern portions of the provinces of Alberta and Saskatchewan, the triangular portion of British Columbia east of the Rocky mountains, and the great northern Territory of Mackenzie.

TERRITORY OF KEEWATIN.

The evidence goes to show that there are some considerable sections in the southern and western portions of Keewatin that promise to be of agricultural value, the climate there being fairly good for settlement, and summer frosts rare.

According to the evidence given before your Committee, there is north of Lake Winnipeg an area of from 5,000 to 10,000 square miles of country adapted to agriculture. Wheat has been grown successfully as far north as Norway House.

The inland fisheries of Keewatin are exceedingly valuable, while the mineral deposits are very promising. The Huronian rocks which occur at intervals carry good indications of minerals—copper, pyrites and different sulphides of that kind. Between Chesterfield and Fullerton there are deposits of iron pyrites, and some of these contain small deposits of gold. Those rocks have not been properly prospected, neither has a large area, near Front Lake, of norite rock, similar to those formations in which the nickel deposits of Sudbury occur.

THE GREAT MACKENZIE BASIN.

As to the vast region north of the Saskatchewan Valley and west of Keewatin, which may be broadly described as the Great Mackenzie Basin, thoroughly authentic and well substantiated evidence shows that that country is very much more valuable than was at one time supposed, and is capable of sustaining a very large and prosperous population. The settlements in this distant region, while, in comparison with its vast area, insignificant in number and extent, are important, as demonstrating practically and unquestionably the great possibilities of this territory as an agricultural and industrial country, and also as emphasizing the importance of exploring and surveying such areas as are likely to first attract the stream of settlement which is bound to set in before long.

According to one witness, who has had exceptional opportunities for familiarizing himself with the country and its resources, there is in the Peace River section of this country as much good agricultural land fit for settlement, and yet unsettled, as there is settled in Manitoba, Saskatchewan and Alberta to-day.

Mr. W. F. Bredin, member of the Alberta Legislative Assembly, who resides at Lesser Slave Lake, and was examined before your Committee, after a careful computation, estimates the area of agricultural lands available in the unorganized territory of Mackenzie, and in northern Alberta, say north of the 55th parallel of latitude, at not less than one hundred million acres.

At Fort Providence, latitude 62·30, about 400 miles north of Edmonton, splendid crops of excellent wheat, barley, oats, peas, and other vegetables are raised, while as far north as Fort Good Hope, within fourteen miles of the Arctic Circle, or latitude 66·16, and 970 miles further north than the city of Edmonton, cabbages, onions and other garden vegetables are raised.

The evidence goes to show that the comparative shortness of the summers in the northern regions is compensated for by the extreme summer heat and the length of the period of sunshine in the summer.

The basin of the Athabaska river is declared to include much good soil, but being of higher altitude than the more northern region, the climate is somewhat precarious, and this particular district is believed to be better suited for ranching than for grain-raising. The ranching industry, in a comparatively small way, has already been inaugurated.

The various sections of the Mackenzie Basin possess great forest wealth, the spruce areas in the north extending to the Arctic Sea.

ANIMAL LIFE AND MINERAL WEALTH.

The rivers and lakes of this region teem with fish of various kinds, and doubtless the inauguration of an important fishing industry depends upon the provision of a market by the opening up of communications or the influx of population.

There is an abundance of game, including an uncertain number of herds, of equally uncertain numerical strength, of the wood buffalo. These useful animals, being protected by law from injury by man, would probably increase in number but for the depredations of the timber wolves, which are declared by all having any experience of the matter, to kill off the buffalo calves as fast as the animals breed. The witnesses examined before your Committee, without exception, suggest a considerable increase of the bounty offered for the destruction of wolves, and your Committee strongly endorses the suggestion.

The mineral wealth of this region is undoubtedly considerable, including deposits of coal, oil, copper, silver, gold, native salt, sulphur, ochre, sand suitable for glass making, tar sands, &c., &c. The large area of oil sands, oil gum, or 'asphatum,' as it is sometimes called, along the Athabaska, promises to be of great commercial value, and prospectors are now engaged, with costly equipments, exploring that neighbourhood for oil. It would appear that in view of the uncertainty as to the exact character of these deposits they demand the attention of the officers of the government for the purpose of devising regulations for the security and proper exploitation of what appears to be a valuable national asset.

Although in the north the thermometer in the winter season registers low temperatures, the cold is much more bearable than are far higher temperatures in countries where there is humidity in the atmosphere. There is said to be little or no difference between the climate at Lesser Slave Lake and that at Edmonton, 250 miles to the south. The Chinook winds blow as far north as Fort Providence, and for twenty-one days during last January it was not necessary to wear overcoats there. West of Peace River Crossing stockmen require to feed their cattle about seven weeks in the winter East of that the snow is deeper, and cattle have to be fed a little longer. At Fort St. John, on the Peace river, they often sow wheat in March, and invariably in April.

Last year at the same place they began cutting the wheat on the last day of July.

Although, on account of the lack of means of communication, and the existence of considerable areas of unsettled lands in the organized provinces to the south and east, there is as yet no great influx of immigration, settlers have been going into the Mackenzie Basin country every year, particularly to the Athabaska district, and the few

widely-scattered and small settlements are steadily, if slowly, increasing, while new settlements are being graduallly established.

As to means of communication with the outside world, those living in this part of the Dominion look forward hopefully to the extension of railway facilities to give their products a route of exportation to the markets of the world. And the construction of railways northwards from the Saskatchewan Valley is being anticipated. The evidence also shows that the pioneer settlers consider that it would be of vast advantage to this region if direct rail communication with Hudson bay could be provided and the practicability of the Hudson bay water route to Europe established. In view of the importance attached by the people of this far western country to the subject of the proposed Hudson bay route, your committee devoted considerable time to its investigation, and heard much very important evidence bearing thereon, details of which will be found in the evidence submitted herewith. There is an admirable natural harbour, susceptible of improvement, at Churchill, at the mouth of the Churchill river.

The evidence taken before your Committee demonstrated forcibly the great extent and possibilities of the inland waterways of the Mackenzie Basin. There have been a few steamboats plying successfully for years on the longer stretches of the Mackenzie, the Peace, the Liard, and the Athabaska rivers, and also on Lake Athabaska and Great Slave Lake. The striking fact was elicited that by the construction of two tramways of an aggregate length of about 20 miles, a continuous water and rail route of 3,000 miles of uninterrupted commmunication, the longest inland water route in the world, can be provided. The matter might well be made the subject of official examination.

RECOMMENDATIONS.

Your Committee has the honour to submit the following conclusions for the consideration of the government:—

(1) That an effort should be made to settle as early as practicable the disputed boundary between Canada and Newfoundland on the eastern coast of Labrador.

(2) That the construction of a railway connecting existing railways with Fort Churchill, on Hudson bay, would open up a large tract of land well fitted for settlement, as well as afford an additional outlet for the products of the west, and where settlements are now being made.

(3) That in order the more thoroughly to determine the resources of the cultivable land of this district, and its forest and mineral wealth, exploring parties be appointed composed of men qualified to report as to the geological formations, the quality of the soil and its natural productiveness, the extent and value of the timber lands, and the navigability of the various watercourses which intersect this district.

Your Committee has the honour to draw attention to the fact that it appears that wheat and other cereals ripen as far north as Fort Providence, latitude 61·30, some 600 miles north of Edmonton. But, as travel in this region is confined to the main waterways, and settlement also clings to the main lakes and rivers, knowledge of the country

is limited to comparatively narrow strips of territory, and consequently the information furnished your Committee is incomplete as to the exact extent of the wheat-bearing belt in the Peace River and Mackenzie River Basins. Moreover, it was not clearly established whether the arable quality of the lands throughout the whole extent of these two river-basins was uniform, as the evidence, for the reasons given, covered but a small part of the territory in question.

All of which is respectfully submitted.

THOMAS OSBORNE DAVIS,
Chairman.

N.B.—The above report was presented to the Senate, Wednesday, April 17, and adopted Monday, April 22,

THE EVIDENCE

NOTE.—The evidence as published herewith has been condensed to the extent of eliminating obvious repetitions, and the transposition of the shorthand report from the form of question and answer into that of direct narration. No essential statement of fact or opinion has been omitted, and, in so far as could be done in rendering in the second person evidence given in the first, the exact expressions and words of the witnesses have been used.

In short, the desire has been to present the evidence in as readable and intelligible a form as possible, and at the same time to preserve the exact and complete statements of each witness.

To avoid confusion, the evidence has been divided and arranged in three sections, as follows:—

Section A.—That relating to Ungava Territory.

Section B.—That relating to the region west of Hudson bay, east of the Rocky mountains and north of the Saskatchewan watershed, including the northern portions of the provinces of Saskatchewan and Alberta, and the Territories of Keewatin and Mackenzie.

Section C.—That relating to the navigability of Hudson bay and Hudson strait as an alternative means of communication with the western regions of Canada.

The evidence of the various witnesses, in the three sections, is given in the order in which it was heard by the Committee, and in cases where witnesses gave evidence referring to more than one section, the testimony has been divided, to keep the subjects as far as possible distinct.

SECTION A.—THE TERRITORY OF UNGAVA.

EVIDENCE OF A. P. LOW, ESQ., B.AP.SC., F.R.G.S., DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

Albert Peter Low., B.Ap.Sc., F.R.G.S., &c., Director of the Geological Survey, was examined before the Committee February 1, 1907, and submitted a list of the officials on the staff of the Geological Survey whom he thought would have special knowledge of the matters under investigation.

Mr. Low was first examined generally as to the area, geographical features and resources of Ungava.

The territory of Ungava, the witness explained, is separated from the northern portion of the province of Quebec by a line drawn from the mouth of the East Main river on James bay eastwardly up the main branch of that river to its headquarters in Patamisk lake near the 53rd degree of N. lat. and from there by an east and west line which extends to the upper waters of the Ashuanipi branch of the Hamilton river, and that river is then followed to its mouth at the head of Hamilton Inlet. The area of Ungava

district is about 250,000 square miles, and does not include a strip along the Atlantic coast extending southward from Cape Chidley to Blanc Sablon in the Strait of Belle Isle, which is under the jurisdiction of Newfoundland.

The land of Ungava is a rolling plateau. This part of the country is from 1,000 feet to 2,500 feet in elevation, except in the northern part, where it is somewhat lower, probably not more than 500 feet high between Ungava bay and Hudson bay. The agricultural possibilities are not great.

THE WOODED AREAS.

The climate is fairly cold even in the summer time, and the tree line extends from just a few miles north of Richmond Gulf on the Hudson bay side across to the head of Ungava bay, and crosses the Koksoak river about ten miles from its mouth. There the trees are only small spruce and tamarack. A fairly high range of hills extends southward from Cape Chidley along the Atlantic coast from 3,000 to 6,000 feet in elevation. and they are wooded. The tree line south of Ungava bay is regular as far as the mouth of the George river, and there on account of the high and being reached it bends to the south and a barren land occurs to the eastward where no trees are found. The bays on the Atlantic coast are wooded at their heads, and after reaching about latitude 56° the trees begin to extend to the outer shore line. The outer islands are not wooded, but when Hamilton Inlet is reached, in latitude 54°, the land is fairly well wooded to the coast line, and in the country around Hamilon Inlet there was also a fairly good growth of timber in former years, but a great part of it has been destroyed by fire; so that the timber now on the Atlantic coast is practically confined to the heads of the bays. This timber comprises white and black spruce, tamarack and a few white birch, and while there are still some fairly large trees there, most of them have gone. The large trees are now to be found in small areas in some of the bays.

Besides Hamilton Inlet there are other areas in northern Quebec, in Newfoundland territory, and at the head of Cartwright bay. In these areas there are fairly large trees which would measure up to three feet in diameter.

There was excellent spruce there, but the fishermen cut a lot of it for firewood and destroyed much more by carelessness in starting fires. Towards the head of Hamilton Inlet there is some excellent timber suitable for schooner masts. The big trees are fairly old and there are clumps here and there along the rivers. Up on the table land there is practically only black spruce and tamarack, and they are small. The good timber is only to be found in the lower valleys.

AGRICULTURE.

As a rule the soil is sandy; it is a boulder drift coming from the Laurentian rocks, except up in the country in the middle of the peninsula, where there are rocks of the same age as those round Lake Superior, containing a large quantity of iron. There the soil is much better, in fact fairly good.

Beyond the northern timber limit, the country is barren or covered with small shrubs and Arctic plants. Witness had seen crops growing in there. Fairly good potatoes and vegetables are grown at East Main river, and also at Hamilton Inlet, but no wheat or barley is grown there now. Witness had no doubt, however, that a short distance up the East Main river they could grow oats and barley; and probably at the head of the Hamilton Inlet some wheat, but the country will never be an agricultural country; it is too cold.

There are no areas which could be called prairie land. The land is rocky, what might be called a rough country, very much the same as the north shore of Lake Superior, though not quite so rough.

The summers are not very long, and the spring is late. There are no crops grown until well in June, but good vegetables are grown at the Hudson Bay post on Hamilton Inlet, and they have been growing them there for seventy-five years. Mr. Low added that he did not think there would be much difficulty in growing the more hardy grains there. In the interior, during summer time, there are rain showers almost every day, but no heavy rains, except for an occasional thunderstorm. On the coast there is ordinary summer weather. Fogs are frequent along the coast.

Witness had been over a considerable portion of Ungava. He had gone from Lake St. John to the East Main river and down it to Hudson bay. Then he went up the Big river and down the Great Whale river, and also made a trip from Richmond Gulf to Fort Chimo, again going up from Lake St. John to Lake Mistassini and across to the East Main, then up that river to its headquarters, and across to the Keniapiskau river, and down it to its mouth at Ungava bay. The following year he explored the Manicouagan river to its head.

There was a post at Michikamau, and there is one at Nichicun and another at Mistassini. There were also posts at other places, but they have been abandoned for twenty or thirty years.

UNGAVA TIMBER.

The principal forest areas of Labrador peninsula are in the province of Quebec. Of course going north the trees get smaller and more ragged, and they have branches almost down to the ground. In this upper land they grow in open glades, and the trunks are not clear and clean, and consequently do not make good logs. Some of the timber would do for pulp very well, but in the Ungava Territory the trees are confined almost wholly to the river valleys and the edges of the lakes, and there is a large area of the country that is barren ground.

The northern limit of the timber line extends from the mouth of the Nastapoka river to the mouth of the Koksoak river on Ungava bay. To the south of that there is a lot of country that is not timbered at all except in the river valleys and around the lakes, the upper lands being barren. These barren lands practically extend down to the boundary of Quebec, so that in Ungava itself, inside the tree limit, witness did think half the country was covered with timber, but he is not aware that any approximate estimate has ever been made by the government as to this.

COMMERCIAL VALUE OF THE TIMBER.

The only timber of commercial value that will be found there is on the rivers flowing into James bay, and perhaps as far north as the Great Whale river. The timber extends inland from James bay as far as the lakes in the centre of the peninsula and between one hundred and two hundred miles along James bay. There are rivers where the timber could be floated, no doubt about that, and it is along the rivers the timber is found.

To reach these forest districts and make them of commerical value, the best way would be via Hudson bay and the rivers flowing into it, for the districts on the bay side. In the rivers flowing north there are practically no timber limits. There is a fairly large timber industry at Hamilton Inlet, but none inland, and there is some good sized timber up the Hamilton river. As to what the cut was last year witness had no idea. The country is fairly well forested up to the foot of Hudson bay, with spruce, tamarack, white birch, banksian pine and aspen.

James bay is very shallow. There are a great many shoals in it and rocky islands which make it very bad for navigation. In fact witness did not think the east side could be navigated with large steamers. The Hudson Bay Company has a schooner down on the bay, and the captain says he knows every shoal because he has been on it.

EXCELLENT WATER POWERS.

There are excellent water powers in the rivers. Asked how Grand Falls on Hamilton Inlet would compare with the greatest water-powers of Ontario, Mr. Low stated that the greatest water-powers of Ontario are small in comparison. The waterfall at Grand Falls is a good deal larger than Niagara, having about nine million horsepower, which is not being used at all now, though it might be made use of quite easily at any time if it is wanted. It is 300 miles practically from the sea, and the only purpose for which it might be utilized is in connection with the development of the iron ores, and of course that is a question for the future to decide. There is a great supply of iron in that country which will probably be valuable in the next twenty-five years.

THE INLAND AND COASTWISE FISHERIES.

The fisheries throughout the territory are excellent. The large lakes and streams are all well supplied with fish. Large lake trout, similar to those found in Lake Superior, and whitefish are very abundant in most of the lakes, as also are brook trout in the rivers and smaller streams.

Lake trout have been caught weighing as much as fifty or sixty pounds, but the average fish is about three feet long and weighs about eight pounds. Whitefish are found in all these lakes, and also the pickerel and the sucker, so that the waters are fairly well supplied with fish. When Mr. Low was on the Hamilton river, he and his party lived for about three months on the fish caught from day to day, and they were never short of food. By setting a net at night they had a good supply of fish for the day. The fish caught were lake trout, brook trout, whitefish and some small landlocked salmon.

The coast fisheries belong to Newfoundland up to Cape Chidley, but in Ungava bay there are some cod fish and the sea run salmon are very good. The George river produces quite a number, also the Whale, Koksoak and Payne rivers, the latter being in Mr. Low's opinion about the limit for salmon going west, though the Esquimaux catch plenty of them in this river during the summer when they last for about six weeks.

Questioned as to what commercial fishing is done in the interior of Ungava and also along the coast, Mr. Low stated that the Hudson bay people catch salmon in the George, Whale and Koksoak rivers, and there is also fishing done along the southern coast of Ungava bay.

Mr. Low explained that he does not think cod fish migrate in and out of Hudson bay. They are found in Ungava bay, and Mr. Low has taken them on the east coast of Hudson bay, and while they are not large or plentiful so far as is yet known, it seems probable that a fair supply will be found in Hudson bay.

THE WALRUS FISHERIES.

Walrus are taken in the northern part of Hudson bay. They extend down as far as Belcher Islands on the east side of the bay. They are hunted mostly by the Scottish whalers who both spear and shoot them. The Americans do not hunt them much. There is a Scottish steamer that goes through Hudson strait every year and engages in the walrus fishery.

Mr. Low did not think the government had done anything as yet in the way of protecting any of these fisheries, but, in his opinion, as at the present time it is only the natives who catch for their own use, protection is not required very much, but as soon as general navigation opens in Hudson bay it will be necessary. The walrus fisheries, however, should be protected at once, because for one walrus taken there are about three killed. Probably four or five hundred walrus are actually

obtained during the season in Hudson bay and strait, which would mean a slaughter of perhaps twelve or thirteen hundred, two-thirds of which are lost.

The walrus is not a valuable animal, but yields a certain amount of blubber which is made into oil, and the skin is only worth from four cents to twelve cents a pound. Mr. Low did not know what the value of the blubber is or what is considered the average value of a walrus.

The Scotch whalers go in there chiefly for walrus, and sometimes they have taken out from 500 to perhaps 2,000 skins and carcases.

At present the Scottish firm have a ship that goes into the bay which is used in hunting both whales and walrus, they also have two slopes up there, so that these three vessels are engaged in the business, and usually there are one or two American schooners also—perhaps half a dozen vessels in all. The Hudson Bay Company's vessels do not fish there.

SEAL FISHERIES OF HUDSON BAY AND STRAIT.

In Hudson bay and Hudson strait there are several species of seals, but not the fur seals, only the hair seals that are found in the Gulf of St. Lawrence and along the coast. These animals are not as plentiful as they are off the coast of Newfoundland in the spring, but there are a fair number in Hudson bay and along the coast. There are four or five species coming into Hudson strait and passing in and out of the bay, but the harp seal comes in and it is found in Hudson bay. The hooded seal also comes part way into Hudson strait, it is the Greenland seal which comes south and whose young are killed in large numbers off the coast of Newfoundland every year.

These seal belong to the Atlantic and Mr. Low did not know whether they went into the strait just for a tour or some such reason, but it appeared as if they were just travelling about on their trip to the north. There is no breeding ground there; as these seals breed on the ice, not on land like the fur seals, none of which are found there. The native seal of Hudson bay are the small bay seal, the big seal, and the harbour seal, all breeding there.

FUR-BEARING ANIMALS.

The marten is the chief fur of Labrador and there are also foxes, otters, mink, black bears, and, further north, white bears. The best skins in the world are obtained in Labrador. These animals are trapped by the Indians and the Esquimaux, but there are no white trappers. The pelts are sold to the Hudson Bay Company, and the Revillon Bros., who are also in there and who buy direct from the native trappers.

The principal fur-bearing animal in Hudson bay or strait is the white bear or the Polar bear, which is fairly numerous, and of which from 50 to 100 skins are obtained each year.

There are reindeer or barren-ground caribou in Ungava, and the woodland caribou, No buffalo. The beaver goes north almost to the tree limit. They are found in Richmond Gulf. As regards feathered game, there are partridges, geese and ducks. The latter are not numerous in Labrador. The food is not good, there being no wild rice about the lakes. The grey goose breeds along the rivers in summer time.

MINERAL WEALTH OF UNGAVA.

In regard to the mineral wealth of Ungava a large area of iron-bearing rock extends from somewhere in the vicinity of the Hamilton river northward to Ungava

bay, practically tn a straighi line. It is probably about 100 miles above the Hamilton river falls. This belt of iron-bearing rock is probably 100 miles long and 200 or 300 miles wide, southeast of Ungava bay.

In addition, there are patches of these iron ores on the west side of Ungava bay and on the Stillwater river, the western branch of the main Koksoak. We find them also on the Koksoak river, extending about 100 miles, and on Michikamau lake. Mrs. Hubbard's party found them below this lake, on the George river, so that there is a large area of iron-bearing rock there. The ore is a mixture of magnetite and hematite, resembling the iron ores on Lake Superior. There is no doubt that in the future, Labrador will furnish a large supply of our iron. It would have come out by rail, being inaccessible by water, away up on the table land above the Hamilton river falls.

As a rule these ores are not of very high grade, they run thirty or forty per cent.

Asked if these ores were not as good as the Nove Scotia ores being taken to Sydney, and carrying a percentage of 54 or 55 per cent, Mr. Low said the percentage would be something like that. Some of the Labrador ores run as high as 60 per cent, 'and they are the largest iron-bearing beds we have.'

IRON DEPOSITS VALUABLE.

The iron-bearing sands along the lower St. Lawrence could not compare with the Labrador ores, as it had been impossible to separate the sand and iron of the St. Lawrence deposits.

Mr. Low said he placed a high estimate on the future commercial value of the Labrador iron ores. There is no doubt they are going to be of considerable importance in the future. The greatest difficulty in making them commercially valuable is the problem of transportation. But there are several millions of horse-power in the Grand Falls of the Hamilton river, and in addition to mechanical horse-power it would also furnish the heat whereby by an electrical process, the reduction by electricity might be performed. Transportation might also be provided by electric power.

There is neither coal, coal oil or natural gas in Ungava.

On the east coast of Hudson bay, near Richmond Gulf, there are lead ores in the ancient rock. The galena does not carry very much silver. There is more iron in this vicinity also.

There are patches of copper in Labrador, but none of those found so far are very extensive in size, and would hardly pay. On the East Main river there is found a conglomerate very similar to that ariund Cobalt, but up to date there has not been much silver found in it. Nickel has not been found yet—the rocks are fairly promising, however, for nickel deposits. As regards gold, there is not much indication of it so far. That is a thing that may be found anywhere. It must be borne in mind that the Geological Survey has only explored some three or four hundred miles of the surface of the country.

Hon. Mr. FERGUSON.—'There have been some private exploration for gold on the Labrador coast from the maritime provinces. There are some lines that are opened up at Rammah, on the Atlantic coast, by the people of Nova Scotia, mining iron pyrites for the cold content. I do not know if results were successful.'

Hon. Mr. CASGRAIN.—'Some United States syndicates have been exploring in the northern part of Ungava for the past two years.'

Mr. Low.—'There have been exploring parties there, but they went more for the trip than anything else. I do not think they are after minerals.'

The witness proceeded to explain that there is mica in Ungava, and traces of asbestus have been found at Chibougamau.

There is a mica mine being worked on the northern shore of Hudson strait. It is the only mica mine being worked up there, and the working is done under the regulations of the Department of the Interior.

THE CLIMATE.

The climate of Ungava varies considerably. The summer season begins some time in June and ends about November 1. The summer is not bad, but, it is a very long and cold winter though the snowfall is not heavy. The minimum temperature runs down to sixty degrees below, occasionally.

Of course a distinction must be made between the northern and southern regions, for they must be 600 miles apart.

In the central southern region the minimum goes down to 50 and 60 and the summer temperature rises sometimes to about 80. The northern regions are generally colder. There is frost every month in the year in both the northern and the southern parts of the territory. Mr. Low could furnish temperature statistics for certain years, he said, but not for every year.

The temperature on the east side of James bay near the Quebec boundary is fairly high in summer. Of course, the cold water of Hudson and James bays keeps the temperature low on the coast, but a few miles inland it rises to 80 and 90.

Honourable Mr. Ferguson drew attention to the fact that Dr. Robert Bell and Mr. O'Sullivan had both spoken of the wonderfully warm temperature of the water about the head of James bay. They gave the date September 25.

Mr. Low replied that he had been in the water but never found it warm. In the southern bays, like Rupert and Hannah bays the tides run out several miles and that leaves a wide margin between high and low water. That would be mainly river water, but fairly brackish. If you go out some distance it is not so warm. Swimming on the surface is not particularly cold, but if you dive down it is very cold.

SETTLEMENTS.

Asked about settlements in Ungava, Mr. Low explained that there are very few settlers in Ungava. Of course, the Indians travelled about the interior, south of the tree line, namely, tribes of Montagnais, Nascaupics, and Crees. The Eskimo are not very numerous, probably not more than 1,500, and of these about 1,000 are under the Moravian missionaries on the Atlantic coast. The remaining Eskimos are also christianized, those in Hudson bay being under the charge of the Church Missionary Society of London.

It is an exceedingly rare occurrence for the Indians and Eskimos to intermarry. There are about the same number of Indians as of Eskimos in the territory, not more.

The only white people in Ungava are those engaged in the Hudson Bay Company's service or by Revillon Frères, a similar trading company. The Hudson Bay Company have posts at Rigolet, Davis Inlet, the Northwest River, and another on the Atlantic coast. In Ungava bay there are posts on George river, Whale river and at Fort Chimo. Then there is a long stretch of coast without posts until Little Whale river is reached on Hudson bay. The succeeding posts are at Great Whale river, Fort George and East Main, and there is a post in the interior at Nichicun at the head of the Big river which comes in at Fort George. Revillon Frères, have a post at the mouth of Big river, and another at Northwest river, opposite the Hudson Bay Company's post.

MEANS OF COMMUNICATION.

At present the only means of communication is by canoe following the waterways. The Hudson Bay Company use large bark or canvas-covered canoes. It would be impossible to get anything valuable or weighty out from the interior of the country at present. Of course the Hudson Bay Company take in supplies and

take out furs every year, by water. They follow the branches of the East Main river down for about 100 miles, then cross to the Rupert river, and follow it to its mouth at Rupert House.

The Hudson Bay Company have a central warehouse at Charlton Island, where their ship unloads supplies. The *Discovery,* of some 500 tons, and drawing probably 16 or 18 feet, performed this service.

On the east coast of James bay there are fairly good ports round the mouth of Big river, but very few on the southern part. In the vicinity of the Paint Hills some useful harbours might be found.

To make navigation successful in the vicinity of Moose Factory a good deal of dredging and improvement would be required to keep it open. The shores are not abrupt, as a rule, either on James or Hudson bay. There are ports but no harbours, Mr. Low thinks, on the east side of James bay that would accommodate large ocean steamers without a great deal of previous preparation.

Mr. Low, in reply to a question by the Honourable Mr. Power, said that he had been to the mouth of the Nottaway river. It is a large river running through a great part of the province of Quebec. Witness doubted if there is a good harbour at its mouth—there is a three-fathom channel, but after the entry into Rupert bay the channel is not well marked by buoys, and it will soon be all ground. Witness had been aground there several times, with fairly small boats. The coast is low. There is a bold, high region of coast north of Cape Jones, after that it gets low again almost continuously to Hudson strait.

What witness said about Ungava applied also, he explained, to the portions of Quebec adjoining Ungava. It is impossible to make a distinction.

If he were going to open up that country for commerce and development he would suggest a route by rail connected with the present railway system, by Lake St. John. The distance from Lake St. John to Ungava is about 300 miles. He would start from Roberval, and there is already a charter for a railway that way. So far there is no railway north of Lake St. John pointing to Ungava.

THE COUNTRY ROUND JAMES BAY.

The Honourable Mr. Power asked Mr. Low whether the portions of Quebec and Ontario which slope towards James bay are of any value for commercial purposes. Mr. Low replied that he thought they would be in the future. The land is very good and limestone extends round there, and goes up the Moose river about 150 miles. You have to go up that far before you get into the archaic rocks. The old rocks and the limestones are found in the bed of the river for about 60 miles up, and the overlying drift would make excellent soil, sand and clay. The climate is not too bad. A limestone country is usually a good country, and of course there were heavy deposits of clay with lighter deposits of sand, forming the surface of the soil in that country. It is deposited from wash in the sea. His observation with respect to that did not apply to the whole of the country which slopes into James bay. Unfortunately the east side for a large area is not very good. There is no limestone on that side, and the country slopes up fairly rapidly, and the soil as a rule is quite sandy.

On the Quebec shore of the bay the limestone has never been found in place. There have been found broken pieces of it, so that probably underneath the deposits of drift there are some beds of limestone, but it is of no great width. It is probably not wide and in many places it is not there at all, because we have these old granites and archaic rocks immediately coming above the surface.

The soil on that portion of the Dominion which fronts on James bay is rather better in Ontario than it is in Quebec, but there is no doubt that much of the country around the south end of James bay will be good. Witness had not computed its extent.

The little district in the province of Quebec between the mouth of the Nottaway river and the Ontario boundary is fairly fertile. It extends around to about the mouth of the Rupert river, and on the Rupert river it extends in, probably 40 or 50 miles, and then it gradually goes out towards the coast, so that at the north of the Big river it is practically cut out altogether. It narrows from the southern part towards the Big river and practically ends there.

THE LABRADOR LINE.

Questioned as to the boundary line between Ungava and the strip of Labrador over which Newfoundland exercises jurisdiction, Mr. Low said he understood it is not defined. This part of the peninsula of Labrador is a strip along the coast, and a lawsuit is now pending as to the extent of Newfoundland's jurisdiction. Newfoundland gave timber licenses and the Quebec government is contesting the right.

N.B.—Mr. Low was also examined with regard to the region north of the Saskatchewan watershed and also on the question of the navigability of Hudson bay.

EVIDENCE OF THE HONOURABLE WILLIAM CAMERON EDWARDS, MEMBER OF THE SENATE, LUMBER MERCHANT AND MANUFACTURER.

The Honourable W. C. Edwards explained that his firm had for several seasons had reliable and skilled men exploring Ungava for timber limits, and he was perfectly well informed of the resources of most of the territory in the way of timber. He had never been there himself, but his five explorers were men of the highest character and great experience, and their statements could be accepted as being correct. His firm had three exploring parties for three consecutive winters in Labrador and Ungava. The first expedition there resulted in nothing, because of the very unfavourable regulations that existed in the Newfoundland territory with regard to their timber concessions, and also from the fact that the Newfoundland people were dealing with territory, which in the opinion of Senator Edwards was not their own, but belonged to Quebec.

Senator Edwards' firm had explored right down the Albany river and to Hudson bay. Almost all the Quebec portion from Abitibi eastwards its parties had explored. They had, moreover, not only explored all the Hamilton inlet district, but all the rivers from the mouth of the St. Lawrence up to the head of the Island of Anticosti.

AGRICULTURE.

Under this head Senator Edwards did not do much more than briefly corroborate what Mr. Low had said. He remarked that on account of the limitations of agriculture, small companies could not operate in the Hamilton Inlet district, simply because the country is valueless. True you can grow something in there. True for a few months in the year vegetation is rapid, but you cannot commercially grow anything there. The same applies to the north shore of the St. Lawrence from the Gulf of St. Lawrence to the Island of Anticosti.

FORESTRY.

Back some distance from the Labrador coast and in the immediate valleys of all the streams in that district the timber is large; also in the district around Hamilton Inlet, around Melville bay, up the Hamilton river in the valleys of all the rivers running into Hamilton Inlet, and also in the valleys of the rivers extending from Chateau bay to the head of the Island of Anticosti.

The timber within these areas is large and good, but the strips do not extend back from the streams for any distance. From half a mile to a mile on each side of the streams would be the extreme.

As to the timber on the mountains about Hamilton Inlet, Senator Edwards was disposed to think Mr. Low had rather underestimated its quality. On these mountains there is a vast quantity of perfect timber. The objection to it for Senator Edwards' purposes was that it is scrubby. That is the only objection, but the time will come, if that timber is preserved, when it will be very valuable. Senator Edwards remarked that he was one of those who hold that the province of Quebec in this Hamilton river country has one of the best timber districts on the North American continent if only preserved, but burning is going on to a tremendous extent, the work of the few settlers that are there. Valuable areas of timber are being burned

up. Settlers simply light fires in the summer time to dry the timber for their winter use. These fires extend over vast areas, and enormous portions of the country have been burned. The senator explained that he had taken five hundred miles of limits there, and allowed them to expire, simply because of the regulations.

On the mountains around Hamilton Inlet there is an enormous quantity of pulpwood. Mr. Edwards said he did not know any place where there is a greater area of pulpwood than there is on the Hamilton Inlet, around Melville bay and for a certain distance into the interior. On the immediate coast of the Atlantic, from Hamilton Inlet to the St. Lawrence, there is no timber.

As to the character of the timber around Hamilton Inlet and the streams running into it, it is disputed whether the first ships masts cut on the North American continent were cut there or at some point in Nova Scotia.

His information was that there was no timber in Ungava north of Hamilton Inlet.

Hon. Mr. CASGRAIN put the following question:—'Is it not a fact that up in that country it is impossible to conduct lumber operations and make them a financial success? You could not grow anything. You have to take your hay and oats for your horses, and your labour, and you have to house your labour and build up all your roads. In fact, you have to take a church in there for your labouring men, and won't that eat up the profits?'

SENATOR EDWARDS replied:—'Not at all. If large areas were handed over to a concern, or various concerns, which would administer the district properly; it would pay. That is exactly what I offered to do. You give me a large enough district and I will give you an enterprise. A large concern could overcome the difficulties, but no small enterprise could go in there and exist.'

Senator Edwards went on to explain that some of the lumbermen operating there are getting labour from Norway.

WATER-POWERS.

Senator Edwards described the Grand Falls at Hamilton Inlet as 'one of the best water-powers in the known world.' It has an enormous head; he did not know exactly what. It has a very large and a never failing water supply, and from the fact that vessels can get right in there, and that there is this large area of pulpwood country in there, there is no district more valuable in the Dominion of Canada than that region; but, its timber resources are being unfortunately destroyed by the bush fires set by the sparse settlement of fishermen.

SETTLEMENTS.

Senator Edwards explained that these poor fishermen eke out but a miserable existence. They are practically starving to death.

There are several Hudson Bay Company posts in that region, who subsist on the fur trade with the natives.

The Newfoundland government claim jurisdiction completely round Hamilton Inlet, and over a much wider strip than usually marked on the maps. In fact the island colony exacts duties there, and even up the Hamilton river. A Mr. Benjamin is lumbering on Melville bay, clearly in the territory of the province of Quebec, but he is operating under regulations of the government of Newfoundland.

MEANS OF COMMUNICATION.

As to the means of communication with the eastern part of Ungava Territory, Senator Edwards explained that explorers going there go up the Hamilton Inlet; and

the largest ocean vessels can go up Hamilton Inlet and unload right off the banks: so that in that respect this valuable producing country would be perhaps better served in that respect than any other portion of the country.

It is possible for shipping to get into Hamilton Inlet for quite a long period each year. One of the advantages of the territory is its nearness to the British market, it being only a ferry across the Atlantic.

Senator Edwards remarked that the information he had given the committee had cost him about $30,000 to learn.

SECTION B.—THE RESOURCES OF THE REGION WEST OF HUDSON BAY, EAST OF THE ROCKY MOUNTAINS, AND NORTH OF THE SASKATCHEWAN WATERSHED.

EVIDENCE OF MR. A. P. LOW, B.Ap. Sc., F.R.G.S., DIRECTOR OF THE GEOLOGICAL SURVEY, GIVEN BEFORE THE COMMITTEE, FEBRUARY 7, 1907.

Mr. Low explained that he had some personal knowledge of the territory of Keewatin, immediately to the west of Hudson bay. He went in by Lake Winnipeg and Berens river, proceeding up that river to the height of land and portaged to the head waters of the Severn river, flowing into Hudson bay. He followed the Severn river down through a number of largest lakes to Severn lake, where he met some Indians, and as he and his party were out of provisions at the time, the Indians took them across to the headwaters of another branch of the Severn flowing into Trout lake, where there is a Hudson bay post. Then they followed the branch to its junction with the Severn river and thence to the mouth. From the mouth they followed the coast to the mouth of the Nelson and Hayes rivers, and return home by the Hayes river, crossing again to the Nelson river, and so on up to Norway House at the head of Lake Winnipeg.

These rivers are navigable only by canoes as a rule, because there are many rapids and falls.

The country between Norway House and Hudson bay is not very elevated. The highest points in it are probably somewhere in the neighbourhood of 1,000 feet above sea level. For about half the distance to Hudson bay it is practically a rolling plain, and the rocks are ancient rocks of the Laurentian and Huronian age. Beyond that there was an ancient deposit of limestone and sandstone, extendng in a wide line around the northern part about half way across. These are large limestones and they are lying almost flat. The country for about half way down from Norway House to Churchill slopes very gently towards the bay, so that the grade is not more than eight or ten feet to the mile, if it is that. The northeastern part is practically a plain.

There are considerable areas of low swampy lands. The surface going down into Hudson bay after you get into the Wolstenholme country is fairly swampy. The rivers have thrown up banks, and it is only at an occasional place that a break through those banks occurred to let out the drainage. In many places the river banks are from five to ten feet higher than the surrounding country, and in consequence the land beyond is drowned more or less, extending back for a distance as far as one can walk in a day very often.

The only other part of this west coast of Hudson bay Mr. Low had examined was up in the region at the far north near Cape Fullerton, where he wintered in the *Neptune,* and where the United States whalers as a rule winter when in Hudson bay.

AGRICULTURE.

Mr. Low considered that probably half the country due east from Norway House, say for 100 miles, would be fit for agriculture. He would rank the agricultural possibilities there as fair.

Of course there are very few settlements in there now, and the only one Mr. Low visited was a Hudson bay post at Trout lake, and they were growing peas and garden truck of all kinds, also potatoes and fairly decent looking crops. They were not bothered very badly with summer frosts, as Mr. Low could see from the crop of green peas. The climate seemed quite favourable for hardy crops. The soil areas that are fit for agriculture are fairly large; the rocky hills only crop at intervals, and there is quite a large area there that Mr. Low thinks will be fit for future settlement.

Tho low flat plain, southeast of the Nelson river, appears to be largely covered with muskeg and small spruce. He would suppose there was more muskeg and spruce land than hay areas. The sub-soil is clay largely. Down in the lower country near the bay there is a certain amount of sand on top. There is a fair amount of vegetable growth. Mr. Low remarked that he would not consider this low-lying area a good agricultural country at present, but with some drainage he thought a great deal of that country around James bay and Hudson bay is going to make a good agricultural country.

With regard to that territory south of Lake Winnipeg and east of Norway House and in the country southeast thereof, Mr. Low thought it would be a rocky country, probably a third rock, or hardly that. Most of the land not rocky would be timber lands. This would run up to about the eighteenth degree or probably more.

As to the far northern region about Chesterfield inlet and Fullerton, it is in the barren lands and unfit for agriculture. The tree line ceases on the coast close to Churchill and crosses off to the northwest towards Mackenzie. The country on the mainland there is quite low. The hills never extend more than 300 or 400 feet. There are no forests up there and the only natural resources would be probably the minerals, the furs and the sea and lake fisheries.

FORESTRY.

In his evidence as to the resources of the more southern sections of Keewatin which he had explored, namely, between Norway House and Hudson bay, Mr. Low stated that the forest, as in a great many other parts of Canada, had been largely destroyed by fire, but around some of the large lakes and on their islands and other places, a fair growth of timber is found in that region with white and black spruce, pine, aspen poplar and white birch of eighteen inches diameter. The trees are fairly clean, and a great many of them would probably make two or three logs, so that what remains of the timber there is fairly decent and good, except on the low swamp land, where the growth is confined to black spruce and tamarack of no great size.

There is no timber at Fort Churchill, that being practically on the limit of the forest area.

Throughout the more southern region described by Mr. Low, there is a good deal of wood that could be used in the manufacture of pulp.

All of the rivers in the region have water-powers.

FISHERIES.

The fish in the inland waters of Keewatin are like those in the other northern parts of Canada, and fairly abundant, especially in the larger lakes. The chief fish are the whitefish and the lake trout.

Mr. Low, in reply to a question by the Honourable Senator Ferguson, said he had not made a study of the fish of Hudson bay to any great extent. There had been no such special study. He went on to state that in Hudson bay the whitefish and the ordinary river trout have sea-going habits, and the Indians take quite a

number along the shores in nets, more especially in James bay. In the mouths of the rivers there are a large number of whitefish and trout taken annually by the Hudson bay people and by the Indians.

There are no true salmon, but there is the Arctic salmon, which is found along the east side of Hudson bay from Cape Jones, and on the west side, north of the mouth of the Churchill river. These are in many places very abundant, and are caught freely in the summer time when they are out in the sea. They go into the sea about July and return to the rivers and lakes again in September some time. They are only out there about two months.

This Arctic salmon is an excellent fish, beautifully coloured, a very fine salmon colour, and it is not as rich a fish as the Atlantic salmon. It resembles the western salmon more than it does the eastern or Atlantic salmon. The salmon fishery on Hudson bay would no doubt have commercial value were there an outlet to a market.

The whitefish of Hudson bay is a very fine flavoured fish.

The portion of Hudson bay in the vicinity of Southampton Island is where the whale fishing is done. Formerly it extended to Marble Island. At present the whales do not come in the southern part, and the fishing now is in Kepple bay and through Frozen strait and in the adjacent bays and inlets. The whale fishing is gradually dying out in that country, and last year there was nobody hunting whales up there except the small Scottish whaling station which is situated somewhere near Nelson strait.

In reply to various questions, Mr. Low said he had no knowledge of herrings or mackerel going into Hudson bay, but there are some cod there. Mr. Low explained that the heavy cold Arctic current flowing through Hudson strait stops the salmon about the northwest corner of Ungava bay. They are found in all the rivers flowing into Ungava bay, but not further west, and the cod appear to have about the same limit. That is the limit of the migration of cod. But in Hudson bay there are cod. He had taken them up near Cape Fullerton and along that coast, but they have not been found very plentiful yet.

FUR-BEARING ANIMALS.

There is considerable animal life and fur trapping done in the northern part of Keewatin. There are the ordinary northernly fur-bearing animals, and they are quite plentiful. There are a large number of coloured foxes. The black, and the silver and gray fox are taken out in that region, and these with the beaver, otter and marten form the principal furs of the country.

In the north each Indian has his hunting ground, and he usually hunts every three years. He hunts one winter and then gives the animals two years' rest. So they have some system and the man owns the lands practically.

There are cariboo in Keewatin, and Mr. Low believes that of late years the moose has been moving into the territory to the south of the Hudson river.

MINERALS.

Mr. Low drew attention to the fact that the map of Keewatin shows a large number of lakes, like Gas lake, Island lake, Favourable lake, Severn lake, Trout lake, &c., and remarked that wherever these patches of water are seen it indicates softer rocks than the other parts. These rocks are usually Huronian, and in many places they carry good indications of minerals, copper pyrites and different sulphides of that kind. At Trout lake there is a large area of what is called norite rock. These are the rocks in which the nickel deposits of Sudbury occur, and there is great probability of a small deposit being found up there.

Marble island does not carry any mineral. It was so named because they thought it was marble when they first discovered it; but it is quartzite or hardened sandstone.

On the mainland where there are marked indentations, there is a large development of Huronian rocks, which contain four per cent of copper pyrites. These rocks have not been properly prospected yet, and there have been no claims taken up on them, unless it has been inside of the last three years or so. They have not been proven in any way. These large areas are there, and when Mr. Tyrrell passed down that coast he landed at a number of places, and at almost every place he stopped found deposits of copper pyrites. Between Chesterfield and Fullerton there are several fairly decent deposits of iron pyrites, and some of these contain small deposits of gold.

Gold was found by Dr. Wright somewhere in Whitcher Inlet, but beyond those discoveries nothing of a definite character is known of the minerals of the far north.

The island of Southampton is formed of limestone, and a band of this ancient Huronian Laurentian rocks, which crosses at the north side of it.

There have been no indications of coal discovered in Keewatin, but Mr. Low explained that on hurried trips such as he had made it was impossible to examine mineral deposits very much, and one is liable to lose many of them. The general character of the southern part of Keewatin as regards mineral resources is good.

CLIMATE.

As to the climate of Keewatin, Mr. Low explained that while in the far north, about Chesterfield Inlet, it is Arctic, in the southern part, south of the Nelson, it is fairly good he thought, for settlement. The summer frosts are rare, and he thought with the opening up of the country it would probably improve. He considered that settlers in there would not have any more difficulty in summer than they would in the settled part of the Northwest.

The summer is probably equal to that of Saskatchewan. The length of the summer days is an advantage. They get more sunlight during the summer than do the people of Ontario or other points further south, and that is a distinct help to vegetation.

MEANS OF COMMUNICATION.

Mr. Low thought that there would be no difficulty about railway construction in Keewatin. It would be quite easy to get a railway through to Hudson bay.

NOTE.—Mr. Low was also examined with regard to the navigability of Hudson bay and Hudson strait. See Section C.

EVIDENCE OF MR. R. E. YOUNG, OF THE DEPARTMENT OF THE INTERIOR, SUPERINTENDENT OF RAILWAY AND SWAMP LANDS, GIVEN BEFORE THE SELECT COMMITTEE, FEBRUARY 7, 1907.

Mr. Young explained that he had no knowledge from personal observation of any of the tract of country to be covered by the committee's investigation, nor could he claim to have any great amount of knowledge from study of the available sources of information. He had, however, been impressed for some time with the importance of obtaining some more accurate information than seems now to be available of the northern portions of the provinces of Alberta and Saskatchewan and the country lying north of the province of Manitoba.

The witness proceeded to explain in a few words why such an investigation appears to be important and urgently required now.

About two years ago there was prepared under his direction a map hanging on the wall of the committee room and marked 'No. 1.' This map, he thought was the means of first drawing general attention to the fact that with regard to the known portions of the provinces above referred to, the area available for homestead settlement was not nearly as great as had been supposed, and that at the rate at which settlement was progressing, it would before many years be exhausted. On this point he asked the committee to compare the map above mentioned which was of date May 1, 1905, with an adjoining map marked 'No. 2,' of date May 1, 1906, and to note the extent to which settlement had progressed, as shown by the red colour, in the interval.

Mr. Young also invited consideration of a map marked 'No. 3,' which showed in red colour the homesteads taken up during the year 1906. He also placed before the committee for consideration in this connection the following statement showing the number of homestead entries reported in each year since 1874:—

Departmental Year ended—

	No. of Entries.
October 31, 1874	1,376
" 31, 1875	499
" 31, 1876	347
" 31, 1877	845
" 31, 1878	1,788
" 31, 1879	4,068
" 31, 1880	2,074
" 31, 1881	2,753
" 31, 1882	7,483
" 31, 1883	6,063
" 31, 1884	3,753
" 31, 1885	1,858
" 31, 1886	2,657
" 31, 1887	2,036
" 31, 1888	2,655
" 31, 1889	4,416
" 31, 1890	2,955
" 31, 1891	3,523
" 31, 1892	4,840
" 31, 1893	4,067
" 31, 1894	3,209

	No. of Entries.
Decem. 31, 1895	2,394
" 31, 1896	1,857
" 31, 1897	2,384
" 31, 1898	4,848
" 31, 1899	6,689
June 30, 1900 (half year; change to fiscal year)	7,426
" 30, 1901	8,167
" 30, 1902	14,673
" 30, 1903	31,383
" 30, 1904	26,073
" 30, 1905	30,819
" 30, 1906	41,869

These figures were taken from the last report of the Department of the Interior.

Mr. Young also placed before the committee the figures of immigration for the last ten years, taken from the same source, as follows:—

Year.	Total.
1896-7	21,716
1897-8	31,900
1898-9	44,543
1899-00 (arrivals for 6 months only)	23,895
1900-01	49,149
1901-02	67,379
1902-03	128,364
1903-04	130,330
1904-5	146,266
1905-06	189,064
Total	832,606

It will be noticed that commencing in the year 1902, a rapid increase took place in the number of homestead entries—the entries for 1906 being nearly three times as great as in 1902. The figures are the figures for the fiscal years. Mr. Young had also the figures for the calendar year 1906, which are 42,012, showing that the rapid growth of homestead settlement was continued up to the latest period for which records are available, that is to January 1 last.

Forty-two thousand entries would represent 6,720,000 acres of land.

The odd-numbered sections have not up to the present time been open to homestead entry, having been reserved in connection with the land subsidies earned by railways. These railway land subsidies are now almost entirely closed out, so that an approximate estimate can be given of the odd-numbered sections remaining in the portions of Alberta and Saskatchewan dealt with in the maps in question. Taking the tract of country bounded on the north by Township 65 in Alberta, and Township 59 in Saskatchewan, and lying east of range 7, west of the 5th meridian, indicated by a line in black on the map, or say taking it roughly 50 miles of country north of the Saskatchewan river, there will be in this area, approximately, slightly under 30,000,000 acres, in odd-numbered sections.

It is from a consideration of these facts that it had seemed to Mr. Young important that all available information should be obtained about the country adjoining to the north the country in which this rush of settlement is taking place, and that additional information should be obtained by exploration in a systematic way.

While his own information as to this northern country was not large, he felt satisfied that the impression which he was inclined to think generally prevails, that the

northern region is a country of little value, is entirely a mistake, and that a considerable area will be found to be available for settlement.

About six months ago, steps were taken in the Department of the Interior, at Mr. Young's suggestion to have a large map prepared which was submitted to the committee, and which contained all the information available from any source so far as could be ascertained, and he believed that a little consideration of this map would bear out what he had said, that the country is of a much more valuable character than had been supposed.

EVIDENCE OF FRED G. DURNFORD, C.E., OF THE DEPARTMENT OF THE INTERIOR, DELIVERED BEFORE THE SELECT COMMITEE FEBRUARY 12, 1907.

Mr. Durnford explained the map last mentioned by Mr. Young, the preceding witness, and which he (Mr. Durnford) had prepared. This map was on a scale of twelve and one-half miles to the inch, an enlargement of the map made by the geographer of the department and extending from north latitude 54 up to 60, and from 93 degrees up to 120 degrees, west longitude. Each of a number of squares shown upon the map contained approximately 2,600 square miles or 1,664,000 acres

Land which, from the information in the department and from other sources (a large number, over one hundred authorities consulted) is suitable for cultivation, was shown on the map in red. Land about which there is very little information was shown in yellow, land which is muskeg or rocky, or generally unsuitable, in brown.

Areas which contained spots of good land were indicated on the map in mixtures of brown and red.

Mr. Durnford explained that he had taken out some figures giving the relative proportions of these various classes of land in the different provinces.

Taking the part of the Northwest Territories shown on the map (southern Keewatin and the southern fringe of Mackenzie), the red land gives about 59,800 square miles, equal to 38,272,000 acres. The yellow or unknown land in that same territory 54,600 square miles, equal to 34,944,000 acres. The brown and water areas in the same territory 23,000 square miles, equal to 14,720,000 acres. That gives a total area for the Northwest Territories, in this portion under consideration of 137,400 square miles, or 87,936,000 acres. The proportion of the red to the whole is 43 per cent. The yellow in that portion of the Northwest Territories is 40 per cent, and the brown and water 17 per cent. The yellow and the red together gives 83 per cent. All the land coloured red, including that in the neighbourhood of Fort Churchill appears to be suitable for agricultural and grazing purposes, and generally for settlement

Witness thought a farmer might do well in the neighbourhood of Fort Churchill. Witness based this opinion on information obtained from about one hundred authorities. In the portion of the province of Saskatchewan under discussion, the red area was 31,200 square miles, equivalent to 19,968,000 acres; the yellow 52,000 square miles, equivalent to 33,280,000 acres. The brown and water area 41,800 square miles, equivalent to 26,752,000 acres, a total for Saskatchewan of 125,000 square miles, or 80,000,000 acres. The relative proportion of the red land in Saskatchewan was smaller than in the Northwest Territories, being 25 per cent; the yellow 42 per cent. Adding these together it gave 67 per cent for yellow and red, the brown and water combined amounted to 33 per cent.

In the northern part of the province of Alberta the red gave 65,000 square miles, equal to 41,600,000 acres; the yellow 77,910 square miles, equivalent to 49,862,400 acres; the brown and water areas 12,910 square miles, equal to 8,262,400 acres; total 155,820 square miles, equivalent to 99,724,800 acres; grand total for area under consideration, 418,220 square miles, equivalent to 276,660,800 acres; and for this the proportion of red was 37 per cent, the proportion of yellow 44 per cent, and the proportion of brown and water areas 19 per cent for the whole area under consideration. The proportions in Alberta were 42 per cent red, 50 per cent yellow, making 92 per cent of the whole in yellow and red, and 8 per cent of brown and water. Hudson bay was not included.

The yellow represented land of which Mr. Durnford could find no information. It is possible that there is information, but he had not been able to lay his hands on it.

The greater portion of the land coloured yellow has not been explored or surveyed, and inasmuch as a good deal of that land seemed to be in the middle of the country which is known to be fit for settlement, the witness thought it should be explored and surveyed at once.

Mr. Durnford mentioned that he had often spoken about this section of country with the son of Professor Agassiz. It is known by the name of the Ancient Lake Agassiz, and the whole of this area, as far as one can gather from geological information, is the ancient bed of Lake Agassiz. The territory lying along the Nelson and the Churchill rivers forms part of this ancient lake. The theory is that as glaciers disappeared they deposited over this surface large quantities of humus, and that the ancient lakes spread southwards, and all the land which formed the ancient bed of Lake Agassiz is fertile.

SOME ANCIENT AUTHORITIES.

The most ancient authority Mr. Durnford consulted with reference to the land along the Churchill river was David Thompson, the man who towers above all the great men of his period, the man whom we first hear of as a boy of fourteen at Churchill, and who took astronomical and meteorological observations all over this country, traversed from the south of the Indian lakes, by Jasper lake, and Columbia river to the Pacific ocean, and to whose maps the Dominion of Canada is indebted for much information, for outside of David Thompson, who surveyed as far north as the southern portion of the Indian lakes, and Peter Fiddler, who completed this work, we are altogether in the dark about the country west and northwest of Churchill. David Thompson's note on the Nelson river from its mouth is to the effect that for 137 statute miles of the river's length the banks are clay and suitable for cultivation. We have not so much information upon the country north of Churchill river, because we are dependent on Thompson and Fiddler, and Thompson's notes, which the witness had consulted, only extend as far as the southern portion of Indian lake. Peter Fiddler's notes are unavailable—as they cannot be found at the present time—but they speak of this portion as very rocky, but from what he says about the character of the soil, one is to believe that it is a Huronian formation and likely to be mineralized.

AGRICULTURE AT CHURCHILL.

One of the best authorities upon Churchill in ancient days was a man of the name of Robson, a civil engineer, who constructed Fort Churchill, who was there at various periods from 1733 onwards, and appears to have been a very careful observer as well as a good engineer. He spoke of the vegetables which he had raised there, and also of the horses which had been employed for several years, and also the cattle at the fort. He said that in spite of the cold winds on Esquimaux Point he was able to produce excellent vegetables. He dug down in the soil—it was in the month of July—and found that he had to dig down a depth of three feet six inches before he came to the frost, represented by a sheet of eight inches of ice, and he makes the note that this thin stratum of ice below does not in any way affect the vegetation. He went on to speak of the horses that were used in drawing stones and other material for the fort, and the fine butter that was made, and spoke of it generally as a good agricultural country round about there. That was in 1733 to 1747.

Mr. Durnford thought it was 1784 when David Thompson first started his diary. It extended on to 1850. He was one of the first men to cross the Rocky mountains and the discoverer of several passes. Howe's Pass should have been named after him. He went very near the Yellow Head Pass, but did not go through, passing by what he calls the Athabaska Portage. Right across the continent from Churchill to the mouth of the Columbia river, he has left

a very valuable series of meteorological observations taken every winter during the time he was with the Hudson Bay Company, for seven years, and later, from 1797 to 1814 with the Northwest Company. He observed at Split Lake; he observed at Sepiwesk Lake, also at Cumberland House, at York Factory, at the South Indian Lake, at Reed Lake, Peace river, &c., &c., and left a series of meteorological tables which are of great value. The opinion that one must gather from his writings is that the principal reason agriculture was not carried on was because the mouths to be fed did not appreciate the benefits of eating vegetables. The Indians being all meat eaters it was thought superfluous on the part of the companies to attempt to raise vegetables or grain for them.

Mr. Durnford had caused to be written on the map described the different points where barley and wheat have been grown. Barley has been grown at York Factory and at Nelson House, wheat and other cereals have been raised there and at other points along the Nelson river cereals have been raised, so in his opinion there is very little doubt that in this country, if the necessity arose, cereals of all sorts could be grown.

FORESTRY.

Mr. Durnford proceeded to refer to what authorities he had consulted had written regarding the forestry of this northwestern district.

Mr. Ellis back in 1748 gave a drawing which is very interesting, showing the size of the timber, and the houses they constructed while wintering at the mouth of the Nelson river.

Mr. McInnes, who is connected with the Geological Survey, had made a very valuable report. He was through this country, going from the head of Lake Winnipeg, as far east as Split lake last year, and he states that just north of Burntwood river near the Hart and Nelson rivers, on the 56th parallel, he found spruce timber as large as twenty inches in diameter, growing at the present time where the fires had not swept through. All this country seems to have been devastated by fire at different periods, but the information we have going back for a century and a half, shows that large timber grew at the mouth of the Nelson river, and large timbers are still growing near Split lake on the Odie river. Spruce and poplar are found, and wherever poplar grows in the northern region you may be sure the soil is good.

The witness read a short article by the United States Counsul at London, Ont., speaking about the timber areas of this northern country, and he makes the statement that from the east coast of Labrador north of the fifth parallel in a northwesterly direction to Alaska there is a belt of timber about 3,000 miles long, and about 500 miles broad which he terms the spruce area. In a very strong article he speaks about the impossibility of exhausting that timber. He refers to Dr. Bell's statement in which he says that the area of our northern forests is forty-four times as large as England and that one such area will supply the present population of Canada, as showing that the timber in that belt may be said to be practically inexhaustible. In the southern border the timber is large enough for lumber, and in the northern it is good enough for pulp.

FISH, GAME AND FUR-BEARING ANIMALS.

As to the fisheries, Mr. Durnford explained that the information from the most ancient authorities such as Thompson, (who speaks of the South Indians lakes, of the Reindeer lakes, and the lakes in the neighbourhood of Nelson river) is that they are valuable. Present information seems to show that the quantity of fish has not decreased to any great extent. Thompson said he found whitefish and fish of all sizes in abundance. Sir Arthur Dobbs, who is also one of the ancient authorities,

speaking of the Little Churchill river, which runs into the Great Churchill between 57½ north and about 95 west, says that that 'river is teeming with fine fish. The rivers and lakes seem generally to be well stocked with fish of the very best varieties, whitefish especially.' Jack and sturgeon were also mentioned. Sturgeon of very large size were spoken of as being taken at the mouth of the Churchill river. Trout were also mentioned, but salmon were not spoken of in the inland waters.

Authorities such as Ellis and Robson and others said that this country between the Nelson and the Churchill was very largely inhabited by moose and reindeer, and they also speak of a large number south of the Seal river, between the Seal and the Churchill. These appear to have disappeared and are to be looked for now on the Doobaunt river, where Mr. J. W. Tyrrell took photographs showing the Barren Lands reindeer by the thousand. He walked in and out amongst them. They were so tame he was able to take those photographs. A very sad fact in connection with these cariboo is that the Indians think the more they kill of them the more there will be. The result is they slaughter them indiscriminately. The musk ox is found further north on the Thelewiaza river and near the Neweltin lakes, but not further west than the Coppermine river as far as witness knew. The cariboo travel north but appear to come back to the edge of timber lands for shelter.

Asked if there are any genuine Iceland reindeer in the country, Mr. Durnford replied that according to information that he had from a paper by Mr. MacFarlane, a Hudson bay factor, the large reindeer are found on the Mackenzie river.

Hon. Mr. ROBERTSON.—'Some years ago the United States government shipped a large number of reindeer from Norway and Iceland to Alaska. Do you know if they have spread over that northern country?'

Mr. DURNFORD.—'I have no information that they have. At Fort Enterprise, on the Mackenzie river, they say they have the larger reindeer. The difference between the reindeer and the cariboo is, I believe, simply with regard to size. The Barren-grounds cariboo or reindeer is smaller than the Iceland reindeer. They are very valuable animals for food, and their skins are used for clothing. Wild geese are found in large numbers throughout the northern country. They are spoken of by Mr. Tyrrell in his travels to Chesterfield Inlet. He speaks of shooting them, and on the Churchill and Nelson rivers large numbers of geese and other aquatic birds are found. Away north, near the mouth of the Coppermine river, very large numbers of these birds are found on the rivers and lakes. There are also several species of geese and ducks, but there are no prairie chickens.

MINERALS.

As regards the minerals, Mr. Robson states that between Churchill and York Factory native cinnabar or mercury ores have been found. He also speaks of the probability of copper being found a short distance north of Churchill. In the latest geological reports, Mr. McInnes speaks about the Huronian formations which are found on the upper portion of the Nelson which he visited, and they would seem to indicate, in addition to what Mr. Thompson says about the South Indian lakes, that there can be very little doubt that this country is highly mineralized. The Huronian is a kindly formation. It is different to the Orchaian or old formations, such as granite and gneiss. They are hard and not kindly for the miner. The Huronian formation, on the contrary, is a kindly formation. It is easily decomposed and produces a soil which agriculturists can work, and in this formation there is every promise of finding minerals such as have been discovered at Cobalt, and in the nickel regions of Sudbury. Those are found in the Huronian and north of the 60th parallel, according to Mr. Tyrrell, who came along the west coast of Hudson bay, there are Huronians. They are not actually mentioned by name, but are described by Mr. Thompson on the South Indian lakes, and generally the country west of the bay is likely to prove not only a good agricultural, but also a very attractive mineral country.

On the Battle river which flows into the Peace river, gold has been found, carried down from the mountains, and is reported upon as being suitable for working with dredges, and further west in the Athabaska, Peace and Saskatchewan rivers we know that there is gold. In the central portion of the map, the province of Saskatchewan, there is very little reason to doubt that the Huronian formation exists in several parts, round about Reindeer lake, &c. North of Lake Athabaska particularly is likely to prove a very important mining section. Mr. Durnford expressed the opinion that nickel and its associated minerals, and no doubt iron ore will be found, and there is also every possibility of finding cobalt and silver in the country north of Lake Athabaska.

CLIMATE.

Mr. Durnford pointed out that the climate varies considerably. He drew attention to the fact that the further south we go the better the stamina of the men we find there. The witness had travelled quite largely in India, and found the nearer he approached the Himalayas the finer the class of men. The men from the mountains, the Sikhs, are men of magnificent physique. You find this applies also as regards the Esquimaux, who appear to be a fine race physically, kindly in their disposition and nature, not cruel to the same extent as those of more southern latitudes, and you find the same thing down in Patagonia. Towards the limit, as you may say, at which men or cereals can be grown you find the best. That had been brought to the notice of the witness very strongly living out in India. Rice is the staple grain of that country, and grows well, yet we find in Carolina a much better quality. The nearer to the poles it is possible for plants or the human species to survive, there the best of their species are found, and so, though the northern climate is rigorous it is habitable.

Mr. Durnford quoted the experience of Mr. Hanbry, who started from Churchill and went north and along the Chesterfield Inlet up to the Arctic ocean, travelled west along the Arctic ocean and up the Coppermine river to Great Bear lake, passing two years amongst the Eskimos in 1904 and 1905. He collected some very valuable information as regards the climate of that northern country. Its people, of course, have been used to the rigours of the climate. He says that new-born children are laid on the snow by their mothers, without their receiving injuries, and he makes a statement which would at first seem almost a fairy story did we not know that he had been living among the Esquimaux in their snow houses. He says that a temperature in that very dry climate of 23 degrees is equivalent to 60 degrees in a more humid one, and that when the temperature reached 28 above zero, they had to cut a hole in the snow house because they found it uncomfortably warm. It is a strange but very valuable statement as tending to show that though the first persons to go into our north country, for instance, natives of the old country might suffer through ignorance, those who learn how to live there would undergo no greater inconvenience than they would in a climate such as we have in Ottawa.

SETTLEMENTS.

Throughout that northern country the only settlements are Hudson bay settlements. There is a small settlement at Churchill and a Hudson bay post on Split lake, one at Nelson House and one at Red lake—they are scattered all over that territory. The people grow only what is necessary for their own use. The people who are dependent upon them have to be fed, and as they have meat it matters not whether they raise large quantities of vegetables or not. There are comparatively few cattle kept. At Cumberland and Norway Houses they have a few, and at one time they used to have a large number. Now that they are nearer markets, they probably purchase their supplies. They are not an agricultural people and do not care to keep cattle. Of course in that country cattle would need shelter, whether at Churchill or Norway

House, in the winter season. You have to go considerably further west before you could let them remain out during the whole winter.

MEANS OF COMMUNICATION.

The means of communication between Lake Winnipeg and Churchill hitherto has been by boats, as also to York Factory. The Canadian Northern railroad is now extending its line from Ekomami to the Pas, a distance of about ninety miles, and have run their survey some 75 or more miles north of that. The distance from Churchill to the Pas on their route map is 450 miles. The distance from Churchill to Liverpool is 2,926 geographical miles, as compared with 2,931 from Montreal, via Cape Race, to Liverpool, a difference of five miles in favour of Churchill. The distance from Montreal to Liverpool, by the Straits of Belle Isle, is 2,763 miles, and from New York to Liverpool, 3,079 miles. The distance from Winnipeg to Churchill is approximately 650 miles, and about the same distance between Prince Albert and Churchill.

EVIDENCE OF ALFRED VON HAMERSTEIN, RESIDENT IN THE ATHABASKA DISTRICT OF NORTHERN ALBERTA.

Mr. Von Hamerstein explained that he first went to the Athabaska district in 1897 on his way to go to the Klondike, and proceeded to Fort Liard and inland, with three of a party. He worked his way back, partly by steamboat, to Athabaska Landing. At that time there was nothing there but a carpenter shop and a Hudson bay shop. He stayed there for a while and then kept a trading store and traded with the Indians at Baptiste lake, and has been around there ever since. He has travelled and mined and traded, and of late has been boring for petroleum. He has specially interested himself in the opening up of the Athabaska country around Fort McMurray, and has expended of his own and other people's money more than $60,000 in machinery and actual development 'in punching holes through the ground.' He has been around the Athabaska river from Lesser Slake lake to the mouth of the Little river, and down the Pembina river, up the Athabaska to Lake Athabaska, around Lake Athabaska and back again, up to Fort Smith, back to the mouth of Peace river, around the Peace river and back to Lesser Slave lake several times, 'and walked every step of it.' In his earlier days in the country he went from Lake Athabaska to Athabaska Landing several times, and used to track boats back and work on the river. He had been inland from the Athabaska river to the Peace river by several routes in the way of hunting, or following up the river prospecting, &c., several times.

AGRICULTURE.

The agricultural resources of the Athabaska district, as far as the witness could understand, are indicated by the farming that is now being conducted with fairly good success at Athabaska Landing, but through all this country the crops may be good one year and the next year they may be destroyed by frost. The soil is good enough, but the climate is precarious yet. They say it may change, but up to this time it has not changed. At Baptiste lake there was when witness first went there no agriculture. He was the first man to introduce farming there. He kept a trading store and the natives insisted on having different kinds of seeds. Amongst others he got some flower seeds, and some lovely flowers were raised. The people raise some crops there now. It is a very good ranching country—first class.

Several people came up there with cattle. A man named Mailloux brought 120 head of cattle, and they are in good shape. The kind of grass there is a red top, a very big grass. The country has all been burnt over and the timber has fallen, so the grass cannot be cut with a mowing machine, but in some places they have cleared away the fallen timber and can use machinery now. Vetches and wild pea vines grow all over that country, but there is no bunch grass to be found; it is mostly red top. How far north it grows witness could not say. He had traced it up in very large quantities on Slave river. About a hundred or two hundred yards from the river there is a big slough, and this grass grows all along there very luxuriantly. There is no place along the northern shores of Lake Athabaska where grass can be grown. It is mostly rock and muskeg.

A little garden stuff is raised at Fort Chippewyan, on soil brought there by the Sisters in pails.

At Fort McMurray the land is good and between the junction of the Clearwater and the Athabaska there is a flat of land about three miles long, and from a quarter of

a mile to a mile and a half or two miles wide, which is very fine soil; but the rest of it is all hills covered by an inch and a half of moss, under the moss being the limestone rock. They raise good garden stuff at Fort McMurray. A party there had good crops for three years.

Wherever there is soil to be found it is very good, mostly old river beds or where eddies have accumulated soil; but the rest is sand and muskeg. At Fort McMurray there is no farming land that witness knew of, nor is there any between Fort McMurray and Lake Athabaska. There may be patches here and there, but most of the land is covered with scrub, small poplars and rough bark cotton wood, or as is sometimes called 'Balm of Gilead.' There are little patches of land here and there, but not much.

Going along to Lake Athabaska there is nothing. East of Fort McMurray there are several lakes, the centre of what is described as fine hay country. The natives there have from 60 to 80 horses, and there are reported to be good grazing patches round the lakes. It is probably a better ranching country than an agricultural one. To the northwest of this district are some muskeg lakes where the natives have quite a few horses and cut considerable hay.

At Fort Chippewyan there is a little garden, but the shores of the lake are sandy, like ocean sand. The Catholic mission are the main crop producers there. They have a garden of about three-quarters of an acre, a little patch in the rocks. They work on it, and tend the plants like sick babies and get some return.

At Fort Smith on the Slave river, is a nice piece of prairie extending in a southwesterly direction to a place called Soiled river, and it is said, right through to Peace Point.

Mr. Von Hamerstein explained that he had been through the Peace river valley frequently, but did not claim to know it very well. It is a nice country, no doubt about it, and a good country for agricultural settlement—as good as any district down in Alberta. The climate and soil are good. The grain comes to maturity in that district, but of course they may sometimes have a bad year. They raise wheat out there, and there are mills which grind the wheat raised in that country to-day. One of these flour mills is at Fort Vermilion, where there is considerable farming in the old river bottoms.

Mr. Von Hamerstein considered the Athabaska and Peace river regions marvellous in the growth of small wild fruits. They grow all over.

In the end of July or the first part of August there are strawberries, and then raspberries and blue berries. Then come the saskatoons, choke cherries, white plums and berries of every description, all over the country. They all have a very nice flavour indeed.

FORESTRY.

Mr. Von Hamerstein stated that he knew that part of Northern Alberta, south of Lake Athabaska very well, because he walked through it every year. From Fort McMurray it is all hilly for the first forty miles, with patches of muskeg. There is timber there consisting of spruce, about half a foot in size. The country has been burnt. Further on there are some lakes which are called muskeg lakes.

From McMurray up in a westerly direction, for about 20 miles there is very good timber. He had seen trees that would make 1,000 feet of lumber. From Athabaska Landing to House river there is timber standing yet. There have been some fires raging, but they have not burned it yet. The timber consists of some patches of spruce, of fairly good size, and the rest is poplar. From House river to McMurray there is no timber left. It is all burned out. There are patches here and there along the river, a couple of trees left standing, and there is some very fine timber in that. There is some timber which Mr. Von Hamerstein used for his work, and he had taken out strips 64 feet long, out of which he had cut his walking beams. There are only patches of this

timber, the rest has been burned. A little further east there is some fine timber at Chippewyan. From the mouth of the Peace river to about Vermilion there is some good timber. The timber ranges north for quite a while of the same quality. There will be a range of timber four or five miles long, and then you come to muskeg. From the Vermilion down, there is no timber left, it is all burned up. There is no young timber growing up to speak of—at least Mr. Von Hamerstein did not see any, except in a few places where a little young timber is starting to grow. Inland it is mostly poplar with patches here and there of spruce, but mostly poplar.

FISH, GAME AND FUR-BEARING ANIMALS.

As to the fish in the Athabaska district, most of them come from Lake Athabaska twice a year to spawn, as far as the Great Cascades, and they are caught in large quantities twice a year. The settlers and natives catch fish all the time. The main shoals of fish seem to come at certain times. The natives are not very scientific fishermen. The Roman Catholic mission catch a large quantity of fish, and the main supply of food for most of the natives is fish. There is the whitefish, the 'gold eye,' a large jack fish generally called the the 'mascalonge,' and the 'maria,' which easterners probably call a dog-fish. The whitefish are to be found in large quantities. They are fed to the dogs. Each dog takes a fish and a half a day. They put up for each dog 150 fish; each man has from 6 to 12 dogs, so that a man will put up 6,000 fish. In the missions they put up ten or twelve thousand and sometimes more.

There is a large fish called the 'Inconnu'—the unknown. They commonly give it the name 'Connie.' They catch any amount of these fish, weighing from 40 to 50 pounds, and they cook them in all kinds of shapes.

As far as game is concerned, there are all kinds of rabbits, partridge and moose, mostly moose—very few deer in the country; cariboo and mink and all kinds of fur-bearing animals.

Mr. Von Hamerstein had, he explained, made a list of the animals which he observed in the country. The most common fur-bearing animals are black bear, which exist in large quantities. Sometimes he had counted in 15 miles as many as 20 or 30 bears. They are entirely harmless. Then there is the brown bear, not very numerous, and some silver-tip bears, and there are mink, otter, weasel, fisher, marten, foxes of all kinds, red foxes, silver foxes and black foxes the wolverine, the coyote and the timber wolf. The timber wolf and the wolverine are two entirely different animals. The wolverine is a gigantic skunk. He has stripes on his back too, and is a yellow colour. He has a very bad scent. He is about the most cunning animal that exists, and not only cunning but mischievous. Out west he is called 'the devil,' and there is no question but that word describes him. He will not take any poison. He will watch when the trapper goes away, and see that everything is clear, then he follows. The witness had been informed that the wolverine is the only animal which has not changed its form since the time of creation. Skeletons of a good many extinct animals and of animals which now exist have been found, all of them showing changes. The horse and other animals have developed, but the wolverine has kept its original shape.

There are muskrats and beaver in that region, but not many beaver now. Timber wolves are there in large numbers, but they have never been known to band together to attack anybody. There are several varieties of the eagle, the Canadian jay, commonly called the whisky bird, one or two specimen of black birds and a small wren. They are the most common birds. There is also seen occasionally a little wild canary. There are also sand pipers and gulls.

As to large game, in the lower part of the Athabaska country, there are moose and a very few caribou, and there is a large kind of deer coming in.

Around Salt river, along the northern boundary of Alberta, where is the great meeting place for all game, they congregate to lick the salt, and there are quite a few

buffalo there. Witness had seen about twenty, and there was said to be seven hundred in the band altogether.

There are wood buffalo as large as the prairie buffalo, and if the government would give a large bounty for the destruction of the wolves, there would be many herds, but the wolves destroy the young as fast as they breed.

Hon. Mr. De Verber informed Mr. Hamerstein that the bounty had been doubled last year; but the witness said he did not know it. The wolves are not being shot.

Mr. Van Hamerstein, proceeding, stated that north from Lake Athabaska there is the musk ox.

There are several varieties of ducks and two of geese, the grey goose and the smaller kind, a white one. They come in the spring and are mostly found around Lake Athabaska. Then they go somewhere in the middle of June, it has not been decided where, and they come back about the end of August in enormous numbers—simply uncountable. They go towards the barren grounds, it is said. If killed when they return their stomachs are found full of cranberries.

MINERALS.

For about two years, Mr. Von Hamerstein explained, he had been engaged in gold mining in the Athabaska and Peace river districts. He has an apparatus for separating the gold from the sand, which is better than panning. Panning is too slow a job. He had inspected the River McLeod at a place called Assiniboia. A half-breed took out $150 from a bar there. He himself took out gold at a little bar right opposite the mouth of the Lesser Slave river in the Athabaska. He worked it for part of two summers. He would take out enough to last him for the winter, and then quit. It is hard work.

The Indians and natives have gold and diamonds on the brain. They had taken to him rocks containing very nice garnets, but they were very mysterious about them.

Mr. Van Hamerstein explained he worked for gold on the Peace river. There is very good mining there, a little below Battle river. But the gold is so very fine that for every dollar you save there, about four and a half go away, and there are some peculiar things which no one can account for. After you have got it there is trouble with the quick silver, which does not take up the gold. The method he adopted was to run the quick silver, and then before running it over again, to roll it in acid.

There is a fine seam of coal at Fort McKay, and the witness took out last season about twenty tons right on the river bank. This is a good quality of bituminous coal which could be used for common blacksmithing, but not for welding. Where exposed and worked this seam goes down about five or six feet deep, and it seems to be getting larger. There is quite a bit of coal taken out to-day by the people who live at Fort Chippewyan.

There is a fine seam of coal at a little creek named Horse creek, which is about a mile and a half south from Fort McMurray on the east side of Athabaska river. Coal may also be found in other places. There is a seam, for instance, about two miles below Stony island.

Up the rivers that flow into the Mackenzie there are large quantities of native salt thrown up. It is mostly under ground, and there seems to be a crater. The salt appears to be close to the ground in large quantities.

At Salt river salt was found right on the surface. There is a spring which comes out of the ground and the water is so salty that it cannot take up any more. Right at McMurray 150 feet of rock salt was found. The traders and Hudson bay people come down and take it with shovels, and they sell all the salt that is used along there. It is taken from Salt river. Witness did not know what they got for it.

At Black bay on Lake Athabaska there is first-class galena—none better. It carries gold, silver and copper. They assayed some of the product at Fort Chippewyan and found that it carried roughly about $6 or $7 worth of gold, and some copper.

There is a big seam near Black bay, and you can follow it up right along until it comes to an island. That is a very good country for gold, and there have been several attempts to make something out of it, but the time is not ripe. The priests up there are of the Oblat order.

There are indications of iron along the Clearwater river. Witness found some very nice pieces of iron, and he found limestone in the centre of Athabaska.

Once in the Peace river district, on the way from Lake Chippewyan, witness found a deposit of red stone, he did not know whether it was ochre or hematite of iron. He had any amount of it, but upset with his canoe and lost it.

A large amount of ochre is found on the eastern bank of the Athabaska, between Athabaska Landing and Grand Rapids. Witness had also observed what seemed to him a large amount of hematite of iron between Athabaska Landing and the mouth of the Greater Slave river. While on the Slave river itself, at a certain point large bodies of magnetite ore are indicated by the action of the compass, which gets entirely out of order.

On the lower part of the Athabaska the limestone which is exposed all along the river is of a very good quality. There is also found clay fit for puddling and for making brick.

NATURAL GAS AND PETROLEUM.

This industry in time to come will be possible and profitable owing to the existence of natural gas, which is found in that country in steady veins. Sand of the very best quality for making glass is abundant, and this industry also is bound to come into existence and be profitable through the existence of cheap fuel, and intense heat in the shape of natural gas in the country. The development of the galena which is exposed in a large vein at Lake Athabaska, depends also on the intense heat and cheap fuel of the natural gas, and will be highly profitable when better communication is established in the country.

Mr. Von Hamerstein drew the attention of the committee to the waste of natural oil gas for the last eleven years at the government bore hole at Pelican Portage or Pelican Rapids.

A very large volume of gas was struck there by the government boring parties, and the well has never been plugged, although there have been representation made again and again. Witness considered that it would be largely in the interests of the development of the resources of that country that the well should be plugged. He considered it an actual sin to leave it as it is. It has now been escaping for eleven years. The last report to the Dominion government was made by the provincial government through the Hon. Mr. Cushing. The value of the well has been decreased tremendously in eleven years, and it is robbing the entire district of gas which may be used in the future.

The government, at the time the gas flow was struck at Pelican Rapids, was boring for petroleum. They went within 60 miles of where Mr. Hamerstein's parties are drilling now, at a depth of 860 feet, or something like that, they struck a tremendous flow of natural gas, which hindered them from boring any further. They thought the well would exhaust itself, went back the next year to resume the boring operation, and finding that the gas had not exhausted itself, they never went back after that. It is still burning. When Mr. Von Hamerstein went up in the month of June last it blew about 18 or 20 feet. About four years ago he found it was about 40 feet. That is a stream right up. It explodes with such force that not a hundredth part of the gas has a chance to be inflamed. The ground all around it has fallen in. Of course as this has been going on for eleven years, it has formed a cavity and the whole thing sinks down. There is a pipe about four feet out of the ground. It was formerly eleven.

There is an eight-inch casing, and then a seven, then a six and a five, and the gas gets between all the casings except the outside. It throws out both water and gas. The place was badly selected when they started boring, right close to the river. They did not take into consideration the character of the river, which rises six or eight feet. Some springs the ice came over and crushed the pipes and made holes in them, so that gas comes out all over. Of course the outside casing is all right, and nothing escapes through it.

Mr. Von Hamerstein expressed the opinion that the hole could be plugged by an expert in the business, but it would be a difficult job. Mr. Von Hamerstein had no doubt that this is the biggest gas well on the face of the earth. He had a gas expert, a Mr. Chamberlain, from Petrolia, who told him that it was the biggest well in the world. Mr. Chamberlain operates in Indiana, Kansas, and all over the United States, and is the largest operator in the natural gas business.

The gas is escaping continually, but sometimes the flow is heavier than at others. On account of not having been cleaned out for eleven years the dirt and mud soaks, the suction of the air causes a cave-in of the ground, and it falls down. Witness had seen the gas jet go 80 feet in the air. If the flow were not of such enormous strength it would drown itself. Witness had never known a gas well in the world to act like that.

On the Peace river there is evidence of natural gas also, small amounts of tar and also evidence of petroleum. That would be sixteen miles from Peace River Crossing, on an island called Tar island. The natural gas springs there throw out small amounts of tar, and about 30 miles from the mouth, on the north shore, there is also a tar spring. It is what Mr. Von Hamerstein would call an oil spring or tar spring, and he had been in communication with people that have money invested in the oil boring business, and was at liberty to state that their works so far made him very confident that they are going to have one of the biggest petroleum fields in the world. There is no doubt petroleum will be found all through that country, from the Athabaska river to the Peace river.

In connection with their prospecting, mining and boring operations, Mr. Von Hamerstein's parties use quantities of natural gas for lighting purposes. They light their camps with it, and do their blacksmithing with it, and it comes in very handy. They get the gas at all kinds of depths, and get several veins of it. They never get petroleum without gas, as they have to strike gas before they strike petroleum, so there must be a large quantity of petroleum there.

GYPSUM AND SILVER.

There are large deposits of gypsum on the southern bank of the Peace river, near Peace Point, which is situated somewhere near the mouth of the Peace river. Very large deposits of the same economic material are in the neighbourhood of Salt river.

Extensive sulphur deposits are found on the east side of the Athabaska river between McMurray and the lake. It is inland about two miles, and in some places it is found in large quantities, and beyond the lake, at several places on the east shore, as well as the west shore of the Great Slave river. The Great Slave is nothing else but a continuation of the Athabaska, with another name. In some places there is a very large amount of sulphur. It comes from an old crater, in the shape of saline water, containing a large amount of sulphur. This saline water at spots runs over three or four acres, the water evaporates, and the sulphur remains.

TAR SANDS OR ASPHALTUM.

Mr. Von Hamerstein proceeded to give some information regarding the beds of tar sands, or 'asphaltum,' as he called it, and as it is called in the district. These beds

occur in the Athabaska district, where petroleum seems to have broken through the surface and soaked the ground for miles around. This substance, Mr. Von Hamerstein explained, could scarcely be termed asphaltum. It is oil gum—something the nature of tar. He produced a piece of this material which he had taken out himself. There are very large deposits of this stuff in that district.

He also produced a bottle containing liquid taken from springs in the ground. He described it as nothing else but a heavy petroleum, which comes out of the ground. There are inexhaustible quantities of that. It has formed pools over the land which are of considerable size in some places. In summer time it comes out in large quantities, but it hardens in the winter and of course the springs take time to get started again. It is not flowing continuously, but flows whenever it has a chance. The cold seems to draw it together and bake it. This is the largest quantity of petroleum witness had ever seen in the world. This area extends from Fort McMurray for 50 miles along the road.

When his party was boring they struck natural gas, and 150 feet of salt. They went down through a hundred feet of salt, and then they abandoned it. At this particular place they went about eleven hundred feet. They never go lower than eleven hundred feet, because they get to the end at that time.

There are very large deposits of this 'asphaltum' up there. Witness thinks there is nothing like it in the world. He has been to Texas, Kansas and Indian Territory, and has looked over the asphalt beds in California, but has found nothing to compare with it. This 'asphalt' does not resemble Trinidad asphalt, for this comes from a crater, and the substance is not the same. It is not straight asphalt, it is nothing but oil gum, out of which can be made asphalt. There is a large amount of petroleum in it. He tested it himself, and got some paraffine out of it. If he could obtain transportation, he could apply it for practical purposes. After it is refined, and all the foreign substances taken out of it, it can be used for road making.

Lubricating oil can be made out of it; and in fact he makes the cylinder oil for his machinery out of it, and also gets some paraffine out of it. The rest he uses for making tar paper. This product will certainly become valuable as soon as there is transportation. The area covered by this substance amounts to about 20 miles square.

Tar oil springs are found all over. You find them in one place, and then proceed further, and you will find them again. You strike the same tar bed perhaps at a deeper depth, sometimes you have to bore down 200 feet through the shale and limestone.

Mr. Von Hamerstein remarked 'As far as petroleum is concerned, I have all my money put into it, and there is other peoples' money in it, and I have to be loyal. As to whether you can get petroleum in merchantable quantities, that is a matter about which I would not care to speak. I have been taking in machinery for about three years. Last year I placed about $50,000 worth of machinery in there. I have not brought it in for ornamental purposes, although it does look nice and home-like.'

MEDICINAL WATERS.

Mr. Von Hamerstein explained that there are sulphur beds and springs between McMurray and Lake Athabaska. There is sulphur and saline, &c., but on the Clearwater river, there are first-class medicinal springs. The natives have been using the water right along, and it acts very well on the bowels. It is like the welll known Hunyadi mineral water. It is a very nice picturesque country, and the natives go up there and doctor themselves.

THE CLIMATE.

The climate in the Athabaska country is about the same as Edmonton. That was about latitude 59. The climate in summer is nice and bright, and not too warm. It is

cold enough in winter, yet it is a nice climate. The river breaks up and the weather gets nice and warm about the end of March. The first snow last year (1906) came about the middle of October.

Of course he had heard the claim made that in the high land the frost would come and kill the wheat. Whether it does or not he did not know. There is only so much land in the Athabaska district available, and the settlers pick out the best. Of course in all this country you get frost in the month of July in the night. You are liable to have it at any time. In the month of September Mr. Von Hamerstein always blows out all his boilers and takes no chance of the pipes freezing.

SETTLEMENTS.

In that part of Athabaska around Fort McMurray, the settlement has grown quite rapidly. Within the last three or four years they have a bank, a telegraph office, a school, two good hotels, two saw mills, and two churches. This has all been done in four years. There has been a little road built up from Edmonton, and the Athabaska land is settled up marvellously. Mr. Von Hamerstein used to run a pony post as a private enterprise, but now there are two stages a week to Edmonton. The intervening country is pretty nearly all settled. People used to let their horses go at nights, but now it is all farms and ranches, and people who came up there did not know at first how they could make a living.

Beyond Lake Athabaska the principal settlements are about Fort Smith, but they are small. You might find in that district a steady population of 60 or 70; the rest would be migratory. They make a distinction there beween 'white half-breeds' and 'Indians.' Some of the half-breeds live a white man's life, and others live like Indians; that is, they are on the move all the time. Fort Graham is the best settlement in the country, and it is a large point of distribution.

From Fort Smith, going in a southerly direction to a place called Soiled river, they have a very fine large prairie, and it extends right through to Peace Point. The people there are not given to farming. It is against their interests, because they could make a living much easier by hunting. People often ask why they do not farm, but it must be remembered that in order to raise a crop of potatoes they would have to stay by it the whole season; and there is more variety in hunting. But some of them do farm and raise a few cattle. The country is difficult of access, they do not get any new stock, and it has become badly inbred. As a result he had seen cattle there having the head of a bull and the body of a calf. There are not very many cattle in there; only certain natives have them, and a man with four or five head of cattle is a very rich man. Some patches of the land are very good.

COMMUNICATION.

Steamers are running regularly from Fort McMurray to Graham Landing; five steamers are running now. The Hudson Bay Co. has two, the Roman Catholic mission has two, and there are others. Mr. Von Hamerstein runs a little steamer—a little yacht. There is an uninterrupted waterway from Fort McMurray to Graham; the same steamers run all over Lake Athabaska as far as Fort du Lac, and go in certain stages of water to Vermilion. The Peace river is navigable at certain seasons, except at the waterfall known as the Chutes which is a hindrance. Down near the mouth there is a place called Little Rapids, and the river broadens out three miles and only in the high stages of the water can you go through it. The witness went through there twice in the first part of September in a little skiff. He could not go through the water, and had to lift the skiff over. Some years it may be better.

EVIDENCE OF MR. ELIHU STEWART, OF THE CITY OF OTTAWA, AT THE TIME SUPERINTENDENT OF FORESTRY FOR THE DOMINION GOVERNMENT, SINCE RETIRED FROM THE PUBLIC SERVICE TO ENGAGE IN PRIVATE BUSINESS.

Mr. Stewart explained that his knowledge of the country beyond the Saskatchewan has principally been derived from two trips that he made, one in 1902 to the Peace river, and during the past season (1906) down the Athabaska, down the Slave river, and down the Mackenize to the Delta, and thence across to the Yukon, and back by the way of Dawson. In 1902 he made the journey from Edmonton to Peace river by way of Athabaska Landing, and thence up the Athabaska river to the mouth of Little Slave lake, through the whole length of Lesser Slave lake to the end of that lake, about 75 miles in length, the distance from Athabaska Landing to this point being about 215 miles. From Edmonton he drove to Athabaska Landing, about 100 miles thence up the stream to the junction of the Little Slave river, and up that river to Lesser Slave lake and then to the end of the lake, Buffalo bay. Thence he drove across (80 miles) to the Peace river crossing.

As to the area of what is broadly considered the Great Mackenzie basin, but which really includes the basins of the Mackenzie's tributaries, including the Athabaska, the Peace, the Liard, &c., Mr. Stewart computed it as 451,000 square miles, larger by over 100,000 square miles than the basin of the St. Lawrence and all the great lakes, and nearly three times the area drained by both of its branches, and the main Saskatchewan river. The Mackenzie, from information Mr. Stewart gained there during the summer of 1906, opens the latter part of May and closes the latter part of October. That does not mean that you can take a boat and go from McMurray down and across Lake Athabaska, and also across Slave lake as early as that. There is often ice in the lakes when the rivers are open. This distance from Athabaska Landing to Fort Mcpherson is 854 miles. He took the Athabaska river to Lake Athabaska, hence down the Slave river, passing the junction of the Peace, down to where he had the advantage of a steamer. There he had to make a portage of 16 miles, and then get a steamer that took him 1,300 miles, or to be exact, 1,299 miles, according to Mr. Ogilvie's survey, down to Fort McPherson, at the delta of the Mackenzie.

The steamer that took Mr. Stewart from Fort Smith, down the Slave, and across the Slave lake and all the rest of the way that 1,300 miles drew five and one-half feet of water.

The average width of the Mackenzie is about a mile. Of course, there are some bars occasionally. After it receives the Peace it is an immense volume of water, but there are no falls below the Slave river; none on the Mackenzie at all, but there is very swift water. The Mackenzie river has not the drainage area of the Mississippi, but it has a greater drainage area than the St. Lawrence above Montreal. Taking the St. Lawrence down to the Gulf it is a little larger than the Mackenzie, taking all the tributaries. For nearly the whole 10,000 miles of the Mackenzie it is so rapid that it is impossible to row a boat against the current. Mr. Stewart did not think it would be six miles an hour, but he pointed out it is very hard to row even against four miles an hour and make any headway. The banks of the Mackenzie are wooded all the way.

AGRICULTURE.

Mr. Stewart produced before the committee samples of some of the grains that are grown at the end of Lesser Slave lake. One was a sample of hulled barley, grown for

the use of the mission schools, another, wheat from Lesser Slave lake, a third another quality of wheat from the Roman Catholic mission at the end of Lesser Slave lake grown that year (1902). These exhibits were principally from the farm at the end of Lesser Slave lake. The Roman Catholic mission there has a very large farm and stock, and grain is grown there by others as well.

Mr. Stewart had no idea of the return they get per acre, but thought likely about the same as they get on the prairie. The soil is similar. On his drive across to the Peace river crossing, Mr. Stewart found that the land is generally a pretty heavy clay. He saw grain grown this side of the Peace river crossing, about 20 miles from it. It was about September 20 when he was there and the grain had not ripened. It had been sown late, but from appearances, if it had been sown earlier there would have been no difficulty in having it ripened. There was a good berry beyond the milk stage, but not far enough advanced to be safe from injury by frost. Mr. Stewart did not know whether that field of grain ripened or not. That was on the uplands. The whole question is whether the grain will ripen in time to escape the fall frosts on that upland. Mr. Stewart said he had noticed in discussions on the Peace river that there was not enough distinction made between the valley of the Peace river and the table land above. There is a high level country and all at once it drops down some 600 feet to a valley. He thought the difference between the height of the banks and the water at Peace river crossing is something like 600 feet. In that valley there is no question at all about the wheat ripening. The witness produced some specimens of grain grown in the valley near Peace river crossing, also some tobacco grown there.

The width of the Peace river valley is very narrow, not over two miles at the Crossing. The soil is good, perhaps a little heavy, with the exception of a few miles which is light and covered with jack pine. The rest is good agriculture land. There would not be a great quantity of it in the valley of the river at that part. The altitude is pretty high, but down the river towards Vermilion it lowers, and probably the elevation of the upland there would not be greater than the level of the water at Peace River Crossing. The grain growing capabilities of that plateau all depend on the elevation. Peace river district is an immense country extending some 600 miles from the mountains to the lake. Down at Vermilion Crossing they raise large quantities of wheat. Of course if you go up to a very high altitude you cannot expect to have the same result, but the wheat witness saw on the plateau above Peace river was uninjured on September 20. But there was frost that night. Witness did not know whether it was enough to kill the grain. However, if they had no frost up to September 20, there should be no trouble ripening grain there, because it ought to be fit for harvesting before the end of August. The wheat in question was sown by an Indian and put in very late.

Along the Athabaska the country is composed of a succession of rolling hills, and there is a good deal of light soil. The valleys are very good, and Mr. Stewart understood that the country through by Lake Waubascow, all the way to Lesser Slave lake, is through a good district of country. Through this district there is good land, perhaps not all the way through. Along the Athabaska the country is light, second class land, but Mr. Stewart found at Calling river some sixty miles below the Landing, a man raising wheat there. He says he raises as good wheat as can be grown, but Mr. Stewart would not consider from the appearance along the banks that there was the same alluvial deposit that are found further north. After leaving Lake Athabaska there is rock along the Athabaska, but there are plains said to be good land extending from Slave lake down to the Peace river. It is in this district that the wood buffalo are, and that would indicate that they get grasses on which they subsist. Below Fort Smith there is a deposit of alluvial soil very similar in appearance and in character to that of the prairie, extending as far as the Rocky mountains below Fort Simpson, and even along the valley then all the way down as far as Mr. Stewart went. It was a surprise to him.

NORTH OF GREAT SLAVE LAKE.

Mr. Stewart was at Fort Providence on July 15, 1906. Fort Providence is near Slave lake on the Mackenize river, in latitude 61·25. This is 917 miles by travelled route from Athabaska Landing, but as near as Mr. Stewart could calculate it, about 550 miles, further north than Edmonton. He saw there on July 15, wheat in the milk, potatoes in flower, peas fit for use, tomatoes, turnips, rhubarb, beets, cabbage, onions, and other garden vegetables.

The tomatoes were not fully formed and witness did not think they ripened. They grew them under glass. The strawberries ripen at any time. In fact they had ripe strawberries before that, also raspberries, currants, gooseberries and saskatoons. The wheat that Mr. Stewart saw there was just in the milk. He inquired when it was sown and was told May 20. It seemed increditable, until it was remembered that there is scarcely any darkness during summer there. There was about 20 hours' sun each day, and the heat was greater for several days than anything Mr. Stewart had ever experienced in Ottawa. Along the lower Athabaska and at Fort Chipewyan, Mr. Stewart and his fellow travellers had it over 100 in the shade for several days. There was a thermometer on the steamer in the shade. Perhaps the heat was greater on the boat than it would have been ashore. Certainly it was exceedingly hot weather, and continued all night. There was very little night at that time. That Arctic heat was something quite unexpected. The hot wave extended down to the Arctic sea that year as Mr. Stewart ascertained from Indians who had come from Rampart House, near the Alaskan boundary to meet the steamer the *Wrigley*. He returned with them instead of coming back with the boat and they lost two of their dogs from the heat, and that in the Arctic circle.

From his observations along the river, that portion of the Mackenzie he travelled through presented a better appearance than the Athabaska basin. He did not see much hay around Slave lake. He was not travelling through the country there.

Asked if he would care to follow farming around Slave lake, the witness remarked that he was not optimistic, but would not care to express an opinion on that because his visit consisted in just running through the country. His principal object was to see the timber, but he took notes of everything else as far as he could.

THE FARTHEST NORTH.

Fort Providence is at latitude 61·25, and Fort Good Hope is north of the 66th degree, or about 350 miles further north. Fort Good Hope, in latitude 66·16 is 970 miles further north than Edmonton, yet Mr. Stewart saw cabbages, onions and other garden vegetables growing in the gardens there. Beyond this he did not see any until he got to Fort Yukon. When you get beyond Fort Good Hope the frost is so near the surface of the ground that it is pretty hard to raise anything. At Fort Macpherson, and in that neighbourhood where the portage is crossed, you are on frozen soil. The vegetables at Fort Good Hope looked as good as any others. The soil there was very fertile.

The name of the fort which is nearest to the mouth of the Mackenzie is 'Point Separation.' It is not on the Mackenzie, and was so named because it was there that Sir John Franklin and Dr. Richardson separated on Franklin's memorable second trip. Turning around Point Separation you come up to the Peel. There is no fort at the mouth of the Mackenzie. The delta is flooded when the tide comes in. Mr. Stewart was there in July.

There were no evidences of vegetation along the river that far north which would lead the witness to conclude that agriculture could be carried on there. As far as Port Good Hope on this side of that place, and around Providence, the country is a fine one; banks twenty-five and thirty feet high, level something like the Saskatchewan at Prince Albert. It is a wooded country.

Mr. Stewart did not observe many wild vegetables or pea vines growing about Port Good Hope. The country for pea vine is Lesser Slave and Peace river, Edmonton and Athabaska and all through there. Witness did not know how far it extends down the Peace towards the mouth. The difficulty was that he had not opportunities of travelling much through the woods. He gathered information and took photographs of the timber, and got views of it, but as for exploring the country and keeping up with these things he could not do it. There is only one boat a year and if you miss that you would be left altogether. The country as a whole is not explored. Regarding Mr. Durnford's map before the committee, he thought there should be a great deal more yellow on it. The yellow represents the country which is not known, and witness thought that should be extended, although we have actual information with regard to certain points.

FORESTRY.

After returning from his first trip in 1902, Mr. Stewart wrote his annual report to the Department, and he read a few sentences therein written, as he had prepared his report when the matter was fresh in his memory.

'The principal tree between the Rocky mountains and the plains is the spruce, mostly the white spruce, and from its position near the prairie there is no doubt that it will be more sought after to meet the increasing demands from that quarter.

'The country along the upper waters north of the Saskatchewan and the Athabaska and Peace river is partly prairie and partly wood. The varieties of timber are principally aspen and balsam poplar, the former predominating, and white spruce. The poplars as we go north seem to increase in size and height, and as we approach Lesser Slave lake and between this lake and the crossing of the Peace river. Below the junction of the Smoky they grow very clean and straight trees, not over a foot or fourteen inches, but reaching a height of 17 or 18 feet, making excellent building timber, as well as fencing and fuel. In some parts there are stretches of good spruce well adapted for lumbering purposes. There has so far been but little destruction from fire in this quarter. The land is mostly level, soil excellent, and if the summer frosts do not prevent it, the country will begin soon to settle up and there will be an ample supply of timber for local uses, if not for export to the adjoining prairie regions.'

Mr. Stewart followed the reading of the preceding extract from his report with the remark:—

'I never saw as fine poplar as I saw there. A considerale number of poplars were over a foot, but a foot would be a fair average. I have seen poplar in all parts of the prairie country, but never saw any growing up as straight. The wheat from Vermilion, it is said, took the first prize at the Chicago exhibition.'

The Hon. Mr. Lougheed added: 'Yes, I saw it there myself.'

Mr. Stewart explained that spruce suitable for commercial purposes grows to the Arctic sea. He was astonished to find that the limit of tree growth extended as far north as it does. He thought it extended probably ten degrees further north in this district than in Labrador. The different kinds of trees that we have in the Mackenzie Basin include white spruce, black spruce, the larch or tamarack, which is found as far north as the spruce, the jack pine and the balsam. Mr. Stewart did not see any balsam in the Arctic circle; aspen, white poplar, balm of Gilead and birch are all found down as far as Fort Macpherson. The natives make their canoes out of birch bark at Fort Macpherson. The size of the timber becomes less as you get towards the north. There is timber growing near the junctions of the Peace and Slave rivers, probably 14 inches in diameter. Below Fort Good Hope the timber is smaller. Some of it has been made into flooring and lumber is made from the timber there. There is a large supply of spruce suitable for pulp.

Mr. Stewart, replying to a question, said he thought it possible to use the poplar wood for commercial purposes. It is very good poplar. It will make pulp, and where it is large enough it can be sawed. It makes excellent flooring. The white poplar in the north is of a better quality than the poplar in the Ottawa district. In the Saskatchewan district and in the far west it is different. In a colder climate it grows more slowly.

As to the extent of the forests, Mr. Stewart remarked that wherever there was a stream there would be a belt of timber.

WATER-POWERS.

Along the Athabaska river there was a very big water-power. There are the Grand Rapids and various other points 80 miles north. On the Slave river there are about 16 miles of rapids which constitute the interruption he had spoken of, and it would make excellent water-power. There is no water-power on the Mackenzie after you get below Fort Smith on the main stream. It is an immense river two or three miles wide, and it has been contracted to a mile.

FISHERIES, GAME AND FUR-BEARING ANIMALS.

The fish are the white fish, the pike, fresh herring, the Arctic trout, and in the Mackenzie there is another very large fish. Mackenzie, the explorer of the river, not knowing what this large fish was, called it Inconnu, and it is still termed the unknown fish. They have shortened the word to 'conny.' Witness thought that he had seen one of these fish four feet long, weighing forty or fifty pounds. He told Professor Prince that it resembled the maskinonge in appearance, and Professor Prince told him that he had contended it was not the maskinonge, but it somewhat resembles the maskinonge.

Asked if there are any salmon trout, Mr. Stewart replied that there is a fish there resembling it, but is not exactly like the trout. He passed over from Fort Macpherson and cut across the mountains, but before he crossed the mountains he heard of the fish, the moose and the cariboo. But after he crossed the mountain the first thing he heard was the salmon. The Indians were hurrying home to catch the salmon. They live on it. There is the King Salmon, the Blue Back, the Dog's Head, the Hump Back, and the witness did not know how many others. There seemed to be a large quantity of fish in Great Slave lake and Athabaska lake, white fish principally, as far as witness could learn, of excellent quality. Great Slake lake is a beautiful lake. There are no fisheries carried on there.

Witness explained that he did not care to go back by the steamboat because it would be slow travelling and he wanted to go over new ground. There he let the steamboat return, and went with some Indians, who had come from the Alaskan country, Rampart House, to meet the steamboat, and were returning. He got them to help carry his supplies over a portage 4½ miles. They had a bark canoe, and for about 400 miles he was kept sitting very still behind an Indian. Their canoes are different from those in this part of Canada. You are only two inches out of the water sometimes. The canoe was heavily laden and of course, he had to keep very still. The Indians paddled fourteen or fifteen hours a day as they were in a hurry to get home to the salmon. They would get the salmon in the Bear river, which is a tributary of the Porcupine going west. Of course those salmon would go to the salt waters.

The wild animals include the bear, wood buffalo, cariboo, otter, beaver (now getting scarce), marten, fox, mink, fisher, and many others. The cariboo and the reindeer are considered the same animal. As far as witness could see, there is no difference in species between the wood buffalo and the animal that was found on the prairie. He did not see any buffalo while there. There are a few of them. They are getting very scarce, and he thought measures should be taken to prevent their being exterminated altogether.

Mr. Stewart remarked that personally he had seen no wild animals. That is the difficulty with travellers who travel by steamer in that country. In the winter the difficulty is equally great, the dog routes being on the rivers and lakes. Where they are not they are on the muskegs, the poorest land, and for that reason we do not get accurate reports of the country as a whole. One of the objects that witness had been advocating in the Forestry Association, putting it as one of the objects of that association, was to consider and recommend the exploration, as far as practicable, of our public domain, dividing it into agricultural, timber and mineral lands, with a view to directing immigration into proper channels. There is nothing this country needs so much as a thorough system of exploration, even in advance of surveys, not to supersede surveys, but to precede them.

MINERALS.

Asked about the minerals, Mr. Stewart explained that at the Coppermine river in the north they got copper. The Coppermine river is east of the Mackenzie, and the river gets its name from the copper which is found there. It is not much used now, still you find certain trinkets made of it.

Then there is the coal. The coal is found at Fort McKay, on the Athabaska and in various places along the route. On the Slave river and before getting to Fort Norman, he passed the banks spoken of in Mackenzie's narrative in 1789 as burning at that time. They are still burning and have been burning ever since, for perhaps twenty miles along the banks. When Mr. Stewart passed the beds were burning for a distance of about a mile on the right bank of the stream a short distance from Fort Norman. Witness thought that these beds were a lignite or perhaps bituminous coal.

There is iron in the Athabaska country, but the witness did not hear of it any further. Similarly he did not hear of much gold further down.

PETROLEUM AND TAR SANDS.

There are evidences of tar sand and bitumen all the way down to the Arctic sea, so he was told. He saw evidences of it in certain places. There is more or less evidence of petroleum all the way along. The tar sand area is of enormous extent.

The witness read as follows, a short report published by the Geological Survey several years ago after an examination of the area where these tar sands occur:—

'The tar sands, the principal bitumen bearing formation of the district, are described in a preceding part of the report. This unique formation is of Dakota age, and constitutes in this region the basal member of the Cretaceous series. It rests unconformably on the Devonian, and is exposed, overlying the latter along the valley of the Athabaska for a distance of ninety miles. Lithologically it may be described as a soft sandstone, the cementing material of which is a bitumen or inspissated petroleum derived from the sub-adjacent limestones. The boundaries of the tar sands were only precisely definited at a few points, but they were estimated to have a minimum distribution of fully 1,000 square miles, where either completely uncovered or buried beneath a part of the overlying Clearwater shale on the high lands, and exposed in the river valleys. They vary in thicknesss where the section is complete, from 140 to 225 feet. The bitumen is unequally distributed through the sands, in a few places merely staining the grains. But in most of the sections examined it is present in sufficient quantity to render the whole mass more or less plastic. The following calculation, which is extracted from the summary report for 1890, although it can only be regarded as an approximation, yet will serve to give some idea of the enormous outpouring of bituminous substances which has taken place in this region.

'An analysis by Mr. Hoffman of a specimen collected some years ago by Dr. M. Bell, gave by weight:—

Bitumen	12·42
Water (mechanically mixed)	5·85
Siliceous sands	81·73

'A cubic foot of the bituminous sand rock weighs, according to Mr. Hoffman, 117·5 pound. This figure multiplied by the percentage of bitumen 12·42 gives 14·59 lbs. as the amount of bitumen present in a cubic foot, or $^{14·59}/_{63·7} = 22·9$ per cent in bulk. Taking the thickness at 151 feet, and assuming the distribution as given above at 1,000 square miles, the bituminous sands in sight amount to 28·40 cubic miles. Of this mass, if the preceding analysis is taken as an average, although it is probably rather high, 22·9 per cent in bulk, or 6·50 cubic miles is bitumen. The amount of petroleum which must have been issued from the underlying limestones to produce 6·50 cubic miles, or by weight approximately 4,700,000,000 tons of bitumen, cannot now be estimated, as the conditions of oxidation and the original composition of the oil is unknown. It must, however, have been many times greater than the present supply of bitumen.

'The commercial value of the tar sands themselves as exposed at the surface, is at present uncertain, but the abundance of the material, and the high percentage of bitumen which it contains, makes it probable that it may, in the future, be profitably utilized for various purposes, when this region is reached by railways. Among the uses to which it is adapted may be mentioned roofing, paving, insulating electric wires, and it might also be mixed with the lignite which occurs in the neighbourhood and pressed into briquettes for fuel.

'The tar sands evidence an upwelling of petroleum to the surface unequalled elsewhere in the world.

'Indications of the presence of oil in the district is not confined to the tar sands, as on Peace river and the Lesser Slave lake inspissated bitumen was found in a number of places lining cracks in nodules, and at Tar island in Peace river, small quantities of tar are brought to the surface by a spring. Tar springs are also reported from several other points, but their existence lacks verification. North of this district tar occurs at intervals in the Devonian limestones exposed along the valleys of Slave river and the Mackenzie, all the way to the Arctic ocean.'

Mr. Stewart produced samples of tar sands collected by himself.

NATURAL GAS.

On the way between Athabaska Landing and Grand Rapids, at a place known as Pelican Rapids, Mr. Stewart saw the gas well that Mr. Van Hamerstein spoke of in his evidence. The well was burning when Mr. Stewart was there in June, and the roar of it could be heard for probably half a mile. Flame was issuing from it, and there was an enormous escape of gas, though not nearly so strong, Mr. Stewart was told, as it had been some years ago. Mr. Stewart expressed the opinion that it would be well spent money to have that gas hole plugged. He had no doubt it could be done. When the government undertook to bore for oil in that district one attempt was made near Edmonton, and they went down somewhere in the neighbourhood of 3,000 feet, when the casing became wedged or something of that kind, and they could not proceed further. Later, another attempt was made at Athabaska Landing. They went down about the same depth and met with the same difficulty. The object of boring in those places was to reach the tar sands, which come to the surface as you get far down the Athabaska river. They calculated they could reach them at a depth of about 2,000 feet at Athabaska or Edmonton. At Pelican Rapids, being further down, some 120 miles below Athabaska Landing, at a depth of some 837 feet, the last 87 feet being through tar sands, the gas was struck which prevented further sinking.

MEANS OF COMMUNICATION.

The present route of communication is via Edmonton. Mr. Stewart, on his trip last year from Edmonton to Athabaska Landing, went over the same route as he had

gone in 1902 on his way to the Upper Peace. He left Edmonton on June 2, and Athabaska Landing on June 8, going down the Athabaska instead of up, as he had gone before. By taking this route he was going down stream all the way to the Arctic sea. Before going up of course the boats had to be tracked, but he had nothing of this going down. He had a steamer to Grand Rapids, 165 miles, and from there to McMurray, had to proceed about 80 miles in boats, the river there being too shallow and there being too many obstructions to allow of the passage of the large steamer he had had from Athabaska Landing.

Mr. Stewart explained that he hesitated to express an opinion on the question as to whether at some time or other there could be a railroad from Lake Athabaska to Churchill. The distance is not over 400 or 500 miles. If that could be accomplished it would open an immense country. There are streams too running in that direction. There is Salt river running for quite a distance, but it has never been traversed.

EVIDENCE OF MR. RICHARD GEORGE McCONNELL, GEOLOGIST IN THE GEOLOGICAL SURVEY DEPARTMENT, HEARD BEFORE THE SELECT COMMITTEE FEBRUARY 18, 1907.

Mr. McConnell stated that he had been in the Geological Survey Department since 1879. He had traversed all over the country from British Columbia to Moosejaw, had been down the Mackenzie and across to the Alaska boundary. He had been all over that western district, but had not been east of the Mackenzie at all. He had been through the country traversed by the Liard river and the Porcupine, and had been up the Yukon, the MacMillan, the Stewart and a number of those rivers.

His exploratory work had been mostly along the streams. He had, however, been over quite a bit of the table land. He had nearly always gone back from the river quite a bit, 20 or 30 and 40 miles in places. From Lesser Slave lake he started on foot with a couple of men packing, and went through all the country between Lesser Slave lake and Big Knife lake, a distance of about 150 miles. Then he went from Fort Providence to Fort Rae, about 150 miles, covering a stretch of country from east to west of about 300 miles. That was in the month of January, and the snow was about three feet deep. He had never been as far east as the Hudson bay basin. His mission was specially to look for minerals, but of course he was supposed to keep his eyes open for anything. Most of the information he could give is to be found in his reports to the department. He reported every year.

The Mackenzie river averages about a mile wide—the finest river in the world. He thought the lower St. Lawrence carried more water in the spring, but in the summer the Mackenzie probably carries about as much. It is a great volume of water. He worked it out at about half a million feet a second. The river extends about one thousand miles from Great Slave lake to the sea. It is navigable all the way, and a boat runs from the rapids on the Slave river down to the head of the delta. There is no trouble with sand bars, but there are occasional islands in the river.

AGRICULTURE.

With regard to the Peace river valley, the value of that country as far as wheat growing is concerned is entirely problematical. If you go there in June or July you will come to the conclusion that it is the finest country in the whole wide world, but witness had been there twice in August and found a heavy frost on each occasion. Things changed very rapidly about the end of August. He did not know if there would be frost about the same time around Edmonton, but the two years he happened to be in that district there would be about fifteen degrees of frost at night. That is in that cattle country, which is considerably higher than the surface of the Peace river. There were no crops at that time. The soil in that district is splendid. It is precisely the same as the country around Edmonton. It is just as good a country if not better. It might be good for the growing of hay or in fact anything. There is no question that the soil is good, and in June and July it is a most delicious looking country. He went up the Wolverine and several of these rivers, and he could not say that all that country coloured pink on the map in the committee room was agricultural land.

In the Peace river country he went down the Loon river, and found much of the country in there partly muskeg ; in fact the greater part of it is muskeg ; but there are patches of country covered with aspen, which is probably good for agriculture. He went all the way down the Loon river and the Red river flowing into the Peace river, and another unnamed stream, and found it

was a prairie country down there, table land with only small areas of bottom land. The table land decreases in height as you go north. As you get down the Vermilion you get the prairie again. At Vermilion the country is not so much subject to frost as in the higher land. They have grown wheat there a great number of years. In the valley of the river the low land on each side is fertile. There is no great quantity of it on either bank. There is just these flats. Taking the aggregate it is a large quantity because it is a tremendously long river. The valley is probably a mile wide on both sides of the river. The wheat had been frozen in August even at Vermilion, but they always grow some wheat there.

Hon. Mr. Power, at this point, asked: 'As you are getting nearer the Rocky mountains you are less liable to get frost?'

Mr. McConnell replied: 'I do not know. It has not been tested very much. They have grown things at Fort St. John. Getting west you are also getting higher. There is a grist mill at Vermilion and a large quantity of wheat is sent there. The wheat is all grown round there. That country is too good a country to be wasted. The valleys are protected from the wind, and the theory is that it is less liable to frost on account of the wind being kept away. There is a magnificent growth of grass in the plateau, and there is hay in the marshes. It is very much the same country as around Edmonton. It is a good place for raising cattle, but they probably would have to feed them in the winter time, the same as they do at Edmonton. Sheep ought to do well. They appeared to have a fair rainfall. Witness thought that as far as the country is concerned it is very much the same as Edmonton. The country is well watered.'

Mr. McConnell concluded that a farmer might succeed there even if he could not grow wheat, if he could get a market. That is the only thing. They grow vegetables right on the Arctic circle, potatoes and things of that kind. Potatoes grow to a fair size at Fort Good Hope. With regard to the soil on the plateau, there is a covering of black mould, and the clay below that, a clay subsoil. They have the Saskatoon berries up there, strawberries, raspberries and red currants, and blue berries. Mr. McConnell thought the spring was earlier, if anything, than at Edmonton. He did not know exactly when it closed up in the fall. He did not think there is much difference between the fall there and at Edmonton. The season is just about the same. It is further west than Edmonton. The soil is also very much the same, and the conditions generally are the same, except that it is a high plateau.

CHANGES IN CLIMATE.

The chairman (the Honourable Mr. Davis) here interjected the remark that when he went to live at Prince Albert, Saskatchewan, there was frost every month in the year. Now they do not know what early and late frosts are; they never cause trouble.

Mr. McConnell.—'You cannot predict about a country in that way. We have the soil up there; that is one thing. I think when the country is all broken up and cultivated it will make a difference. The rays of the sun will get into the ground. The country up there is improving.'

As to the extent of lands suitable for cultivating in the Peace river country, Mr. McConnell said he would not call all the country coloured pink on the maps agricultural land. He knows it is not, but there are aspen ridges all through that country which may be good, but they are separated by muskegs everywhere, except on the table prairie. You have these muskegs with solid ground in between them, and in those places aspens grow, and where you find those poplars the land is nearly always good. But the poplars do not grow to any size. The aspen is not on the prairie; it is on the wooded country, in between the muskegs.

Besides there are occasional patches of prairie at Vermilion, following the Peace river down and also the Grand Prairie.

There is no large continuous prairie once you get thirty miles from Edmonton. You go out of the prairie country. Then you simply get occasional patches of prairie.

That Grande Prairie or North Peace country, which is about 75 miles across, is probably the largest, and there is a prairie following the Peace river about 25 miles. That disappears as you follow down the Peace river, and the country is wooded and partly muskeg until you get down to Vermilion. Then you get another small prairie area there. Taking the upper stretches of the country, when you get back north, forty miles from the river, you get into a country partly muskeg. If you were travelling across it with horses, you would be running into a muskeg every couple of miles, and there are ridges only a few feet higher than the muskegs, and they are nearly always covered with poplar, and those ridges seem to be fairly good agriculture land, but they are always separated by these muskeg lands. This muskeg is very deep. Witness had had horses go down in it. Along all the streams you get a certain amount of good land. There are a great many streams in that country, and in the aggregate the amount is large.

As to the Grand Prairie, or North Peace river country, the soil is very good there. There is a sub-soil. It is a good wheat country, and in June and July it is looked upon as the best wheat country in the world. He had noticed the pea-vine growing in that section, and so far as he could judge from going over it, the country is a good agricultural one, except for frosts. There happened to be some frosts both times witness was there, but apart from that the country is certainly good. There is swamp grass growing about the margins of the small lakes. It was after the middle of the month of August that he experienced frost there. He did not know much about the growing of vegetables in the Peace river country. He did not happen to be in places where there was any farming going on, but was at Fort Providence in the autumn and wintered there one winter, and ate potatoes, turnips and other vegetables like that all winter that had been grown there. That is north of the Great Slave lake. There is a little prairie up the Liard river. It is the most northern prairie witness knows of.

The potatoes at Fort Providence were not large, but they were a fair size. The potatoes grown at Dawson were of good size—good table potatoes.

THE MACKENZIE VALLEY.

Going down the Mackenzie, once you get away from the river flat you get into a rolling country partly with muskeg, with hard ridges between. The only possible part of that country suitable for agriculture, Mr. McConnell thought, would be the large flats down the Mackenzie river. It is a wide valley, but there is the same thing there, you never know exactly before hand what is going to happen. Certainly it does not look like a favourable country for agriculture once you get away from the river.

The prairie on the Liard river is a little north of the 60th degree of latitude. There is a lot of marsh hay growing around the Great Slave lake. It would be good for feeding stock. Along Great Slave lake itself there is a large tract of flat country which may come in some time. Most of the grass Mr. McConnell saw there was a heavy marsh grass. It is not jointed, though there is some of that kind. He remembered seeing patches of it on Hay river.

Asked as to the extent of good agricultural land in the country, Mr. McConnell said it depended on what was called good agricultural country. He knew that at Fort Good Hope right down on the circle, they can raise good potatoes, because he saw them, and there is no reason why they cannot raise vegetables all the way down the Mackenzie as far north as that. The land on both sides of the river suitable for agriculture does not extend far. There are flats two or three miles wide—bottom flats of the Mackenzie a mile to a mile and a half wide. Once you get up out of the valley the country is rolling and partly muskeg. There is a large tract of that sort of country extending as far north as Fort Good Hope. It is about a thousand miles altogether from Great Slave lake to the sea, and that flat would be six to eight hundred miles in length.

The witness, in reply to a question by the Honourable Mr. Robertson, said that at certain points on the flats there would be danger from floods. The floods usually

occur at certain points in the spring when the ice is breaking up. That is about the end of May and early in June, when the ice goes out of the Mackenzie. There are certain places where the ice jams, and forms great ice dams and backs up the water. At Fort Simpson they were almost flooded out the spring Mr. McConnell was there. The water rose forty feet. The jams occur about the same points every year, at the bends of the river.

FORESTRY.

The timber through all this country is confined to large spruce. White spruce is the main tree all through that country. You get spruce from a few inches up to two feet through all the way along the Mackenzie, o nthe flats, and on nearly all the tributary streams. Mr. McConnell found spruce at the delta of the Mackenzie over two feet through. Of course only an occasional one grows that size. They average ten to fifteen inches. Along the Liard there are good bunches of timber, and it is the same with all these other tributary streams. Once you get away from the flats the timber is sparse and the trees are small. You get small black spruce on the muskegs. The timber is simply on the flats and extends back two or three miles from the river. That is not solidly timbered on either side of the river. The poplar does not grow to a large tree as it does down herc. It runs about three to six inches through. The rough bark poplar grows up to a foot or more.

In the southern part of that region you find balsam fir. There is balsam fir in the Yukon country. Witness did not remember how far north it runs. You get the jack pine, the same sort of pine that grows on the prairie, in places. It grows as far north as Fort Good Hope. You get it in patches on the sandy flats. It does not grow very large, but some of the trees would be big enough for railway ties.

Asked if there are large flats of black spruce, Mr. McConnell explained that the country is not forest continually like it is here, but most of the country is open wood. Nearly all the muskegs and around the muskegs is covered with black spruce.

The Mackenzie has no rapids suitable for water-powers, but the streams flowing into it must have. There are groves of timber patches along the river all the way to the mouth.

Taking the Mackenzie as a whole, Mr. McConnell considers that there is a good quantity of timber, a lot of which would be fit for manufacturing into lumber. On almost every flat there is a grove. Some timber has been destroyed by fire. Fires have run in places, but the timber is not badly burnt.

FISHERIES AND FUR-BEARING ANIMALS.

There are great quantities of white-fish in nearly all the lakes. Mr. McConnell wintered at Fort Providence just below Great Slave lake, and in ten days there were about one hundrtd and forty thousand fish caught. They come into the shallow part of the lake about September 15. They are caught by the Hudson Bay Company, the missions and some Indians. They use fish to feed the dogs, men and everything. It is the staple food of the country, or was, the year witness was there. They catch the fish at all seasons, but late in the fall is the particular time for catching them for the winter supply. They get salmon trout there also. At the Fort he had had them weighing 15 to 20 pounds and they told stories about catching them 40 pounds in weight. There was one King salmon caught at Fort Providence—only one. They also get pike or jack fish. Witness did not know about pickerel.

The inconnu is a fine fish, and is caught all the way along the Mackenzie and up the Slave river as far as the rapids. It is a large fish weighing from ten to twenty pounds.

There is a lot of fur in the country—marten, fox, beaver, otter, bear. You do not get the barren lands cariboo along the river, but once you get west to the semi-barren land, you get cariboo in tremendous numbers. There is a herd of buffalo west

of the Athabaska, another herd north of Fort St. John, and another a little further north. Witness does not think any person knows how numerous those herds are, but they are not very numerous. He saw the traeks of one herd. There are large timber wolves all through that eountry. He had not heard whether the wolves were destroying the young of the buffalo.

MINERALS.

The Maekenzie valley is not what would be ealled a mineral eountry. The only mineral Mr. MeConnell saw was small lignite seams near Fort Norman, and there are possibilities of oil all through that eountry. There is a tar spring north of Great Slave lake, and down below where Tar river eomes in the oil is simply dripping out of the shale in several places. That is real shale, or orebearing roek. There was no mineral along the Mackenzie as far as he could see, exeept the lignite seams and oil.

East of the Maekenzie some distance, you get into the mineral country. Witness had never been there. West of the Maekenzie you get into a possible gold eountry, but the Maekenzie itself does not flow through a mineral country.

In the northern portion of Athabaska and Lesser Slave lake, there are chanees of lignite seams in several of the formations there. All through that eountry again there are chances for oil. Every one knows about the tar sands along the Athabaska. There is tar there for about one hundred miles to a depth of 150 to 200 feet, and several tar springs. One is reported at Lesser Slave lake, one on the Peaee river, so that all that stretch of eountry is a possible oil eountry.

There is fine gold on the Upper Peace river, and it might possibly be found in quantities. It is different from gold in other parts of the eountry. There are no quartz seams, but gold is found in the river bars. There are iron stones eonneeted with the coal, which is found on some of the streams of the Upper Peace river. Witness did not remember seeing any eoal on the lower part. It is nearly all lignite.

There is salt on Salt river. There is gypsum down the Maekenzie too, but so far away from transportation that it is not worth mueh. There is a very large deposit of it near Bear mountain.

Witness did not know of any sulphur in the northern country.

CLIMATE.

The winter is longer at Fort Providence than at Edmonton. The ice does not go out of Great Slave lake on an average until July 1. That portion of the river from Great Slave lake, down to the Liard, does not open up until about the same time, or about the latter end of June.

The snow goes off in May, and witness remembered getting flowers on May 28 below Fort Simpson.

EVIDENCE OF DONALDSON BOGART DOWLING, B.Ap.Sc., OF THE GEOLOGICAL SURVEY.

Mr. Dowling explained that his experience of the country under investigation dated from a trip by Lake Athabaska through Reindeer lake and back to the Churchill, and then through to Prince Albert, in 1892. Then in 1899 a trip through from Fort à la Corne down the Saskatchewan through to the Burntwood river, touching the Churchill again below where he was before. Then he made a trip down to James bay and through the country on the western corner of the bay.

For a great part of this country around Hudson bay and James bay, in Keewatin, from the eastern end of Lake Athabaska eastward to Hudson bay, and southward around the southern part of the bay, there is a sloping basin, which slopes towards the central part of the continent, but it is not a heavy slope. It is a very gentle, undulating plain, not broken into rough hills, but mammalated, gentle rolling in every direction. The lowest point in this would probably be in the centre of the district outlined, the Nelson river. That river does not flow in a valley. It simply occupies the lower portion of a depression. There is an easy depression up and down again on both sides. The river itself does not keep a channel, but flows from one basin to another, spilling from one lake into another until it gets down near the bay, and then it cuts some crevices in the limestone, which is lying just on top of the rocky country witness had mentioned.

GEOLOGICAL HISTORY.

As to the soil, a great deal of this country has been swept clear of the old rotten rock which makes up our soil. This stuff has been carried away to the southern part, and behind has been left a lot of the coarser material which goes to make up soil even yet, but after the glacier had swept over the country it did some good by acting as a dam, and holding back some of the water which resulted from its melting, forming lakes in its front, and in these lakes was carried back some of the finer material which helps to make up the soil. Thus in Manitoba we have the bed of the old Lake Agassiz, but around James bay and Hudson bay we can assume first of all that the glacier which swept Keewatin, and came from the northeast, swept the southern part of Hudson bay and part of Keewatin, and stopped in the vicinity of Nelson river and Lake Winnipeg and so on to the south. Then before it started to retreat, another glacier from northern Keewatin at its centre, near Cherterfield Inlet, sent ice south along the face of its first glacier, and as it was melted back again it left a body of water in front of both glaciers. Then we have a triangle outlined by the Nelson river on the east, the Burntwood river and Burntwood lake on the west, a narrow triangular strip in the Nelson river valley, between the Nelson river and the Churchill, which is covered to a depth of 100 feet, by a deposit of clay, fine clay and silt, with, on its western side, some sand occasionally interbedded and sometimes with deep soil along the western margin, and along the eastern more bouldery. You would imagine those boulders had dropped over the edge of the ice into the lake and were left there. East of the Nelson river the deposit of clay and boulders is very inconsiderable. There is hardly any. Just what is left now is what was in the ice when it stopped—it melted away and left the boulders and some clay there.

West of this clay plateau, over the country towards Ranger lake, there is a similar condition prevailing. The country has been swept bare, and in the depressions you will find clay deposits with boulders. The hill tops will resemble our Laurentian hills to the north, reddish granite with a few trees, and you see the colour of the rocks on

the hills, but in the valleys there will be soil enough to grow most of those trees. Now, to carry on the history of the clay deposits further east, I should say that when the ice left this country it also left the southern end of Hudson bay, extending further inland than it does at present. That is, the Hudson bay waters invaded the southwest and south side of both Hudson bay and James bay, and of course to the north there are some great depressions, but then we can imagine that when the ice had disappeared Hudson bay and James bay were much larger than they are now. The depth of water which has disappeared is just about 500 feet; that is if you go from the Hudson bay or James bay up the rivers until you get an elevation of 500 feet above the present elevation of the bay you come to the original shore line, and that is marked simply in this way: All the way from the bay you are passing through a plain which is nothing but deep sea clay, which has been deposited from the sea. There is no doubt about that being sea deposit.

AGRICULTURAL LANDS.

We have only two parts that are agricultural lands, that we could consider as agricultural lands in this vicinity, and that is the triangle between Churchill and Fort Nelson, and the strip of country around James bay and Hudson bay. The rest is only possible in an extreme sense. It is a case of markets. There is a mission there, and the priests have a garden.

When these two portions of agricultural land first appeared above the water, the portion to the east was probably first. The water was drawn away and the portion to the west came up afterwards. The history of this country cannot go back more than ten thousand years until it gets under the water. The next movement that occurred was that the southern part of the country was elevated, and the streams over this new country were given a tendency to run towards the north, and they all ran in that direction, but later on streams wanted to run more easterly, and so all these streams that are running not through that rock but through the clay belt ran in that direction towards Hudson bay—ran to the north and turned abruptly to the right. In reference to the history of this plain being very recent, it has this bearing, that the drainage of that area is also new; that is that the streams having completed their valleys, the valleys are merely straight cuts. The drainage makes some difference in the country as an agricultural land. There is the clay, and the next thing is to make that an agricultural country, and Mr. Dowling pointed out that its early entry gave such a short time to drain—that is, the natural drain—that most of that country is drained by ditches, they are not river valleys but ditches, and therefore the drainage does not extend on either side very widely.

There are then, along the river valleys, a strip of a mile or less than a mile on each side of well-made country, covered by very fine forests, and giving rather a false impression of the country as a whole. The centre portion between the streams is now exactly as it was when it came out of the sea, except that it has some vegetation on it which it had not at that time. All it needs is the drainage. That is the point. The soil and the climate are good. The same might be said of the portions between the Nelson and the Churchill.

FORESTRY.

Along the river valleys the trees are always well grown, but back from the river on the plateaus you get into muskegs and small timber that kill the soil simply because it is not well drained. The muskegs there are not very deep.

Around Churchill Mr. Dowling had seen timber down to the mountain. The timber does not grow quite so large there. There is a strip all along the front of the bay which has no timber. Back in the interior there is timber. The vegetation around the bay is very good. You would not know that you were so far north.

There is probably a good quantity of pulp wood in Grand Rapids, on Lake Winnipeg and on the Saskatchewan river, but that country is mixed. It is spruce and poplar, and if you go north from the Moose Lake country you get away from the poplar and you get into the spruce country, pure and simply—spruce and jack pine. There is lots of that and it is fairly good for pulp wood, but I do not think it will ever grow to timber. The jack pine might be used for ties, but it is not suited for it.

WATER-POWER.

Asked by the chairman as to the water-power on the Saskatchewan, Mr. Dowling explained that there is a fall of 80 odd feet in four miles of a rapids, where the river falls into Lake Winnipeg, and at the mouth of the rapids there is a strip of deep water for a harbour. It is a good harbour. You could probably get a fall of 50 feet in half a mile, and witness thought it could be made available by building a canal on the side. It is a large stream, about the same size as the Ottawa. In the fall it is lower than the early spring, except the fall of 1899 when it rose 25 feet and swept the explorers out of the country. You could not develop as large an amount of power there as you could in Ottawa, because it is not so well situated. At Ottawa there is a group of islands where the water can be divided, but at the Grand Rapids there is a narrow channel running around the horseshoe bend, and the country on both sides is much higher than the river. The river is down in a deep cut. If the channel could be put across the bank, directly across the bend, then there would be an immense water-power. By building a very large conduit, and probably a tunnel through there, a large power of water could be obtained.

FISH, GAME AND FUR-BEARING ANIMALS.

With reference to the fisheries, small whitefish come to the shores of James bay, also herring and some other fish witness did not know, but all the rivers are abounding with whitefish, perch, dore and jackfish. Some of the upper, larger streams have sturgeon.

With regard to fur-bearing animals, that is probably the richest part of the Hudson Bay Company's preserves. Their mink, and formerly their beaver and marten, or a great percentage of them, were from this part of the country. The killing of beaver is prohibited, so that now there is no shipment of beaver. The blackest beaver and the whitest beaver witness had ever seen came from near the Lake of the Woods. In the country down near the bay there is less beaver, and more of the nomadic animals. That is the wolves, foxes, martens an otters. Witness did not hear of many lynx in this country, but there are a large numbers of them further west. They are probably more partial to the dry country. It is a great country for foxes. They seem to be able to live on the sea birds and mice. They can live where the minks cannot apparently.

There are a number of cariboo and there are a lot of moose from the west side of Lake Winnipeg. The moose are now getting into the upper part of the country. Witness thought that the north of Lake Winnipeg was better supplied with moose and cariboo than the eastern side. The musk-ox would be found in this country. Witness saw five bears in this district, 'but that may have been just luck.'

MINERALS OF KEEWATIN.

With reference to minerals, the country is not rich in that regard. Most of the country passed through is covered by granite, so that you do not expect to have anything very rich. There are some iron ores in the vicinity of Stoon Mill lake, west of the James bay and south of Hudson bay. There are three or four areas in the country

of the Saskatchewan that have some rock, such as at the Lake of the Woods and Cobalt, and the rich mineral country—the Huronian rocks. It takes time to find minerals. This first area he spoke of is only 40 or 50 miles northeast of Cumberland House on the Moose river. The area in question lies north of Athapapuskow, Cranberry lake, and Red lake, as well as Wabishkoka lake. There is another area of the same rocks on the Nelson river, crossing the Grass lake and running through the Pipe Stone lake. There are probably some minerals in those rocks. Outside of that you will not find anything of very great importance.

The character of the rock at Lac La Ronge, north of Prince Albert, is limestone. This country is just in a wide limestone district, starting from Lake Montreal, which is on a cutaneous hill. From Montreal lake to Lac La Ronge you go down stream at a great pace, running down through sandy beds, and a great mass of stuff which you could never get through. When you reach Lac La Ronge you are down to limestone. Between those two there are all those rocks which carry coal oil or petroleum in the Athabaska country. There is a line of hills here, that are so covered by the sand and gravel that nothing can be told about what there is in them till they are explored by boring or digging.

Mr. Dowling being asked if there are any indication of the rock containing any material used for making cement, replied that in that country there are only two places that he knew of where the right kind of lime could be got. It is clay and shale. You must have the limestone free from magnesia. The two places he referred to are in Manitoba, Split Rock on Lake Manitoba, and some little island in Swan lake, near Dawson bay. There is an island on the lake with pure limestone, and a point on Lake Manitoba. The limestones of Lake Winnipeg and all the other lakes are too high in magnesia.

Witness knew nothing about the coal seams at Lac La Ronge, but he had seen coal there. If there is a coal seam it is on the hill above the level. At Lac La Ronge there is limestone in the bed of the lake. The coal is up above the limestone. If there is coal there, it must have been discovered on the river running into Lac La Ronge, because Lac La Ronge is too low. You have to go up a hill to get coal.

There have been no indications of oil along that country of the character of the Athabaska oil. In some of the higher lakes above the Athabaska the oil had been distilled.

There is iron ore, and the possibility of gold and silver ore, and also copper ores in the Grass river district. There is no asbestos. With reference to mica, it can be found all over that country, but it is in small pieces. It is not likely to be very large at Stanley. Witness would hardly expect a large piece of mica to be found there. There are some amber deposits near the mouth of the Saskatchewan river. It is all in small bits like pieces of resin, in fact that is all it is. It is resin brought down by the Saskatchewan river, and left there. It is not a very valuable mineral, too hard and brittle to be used for pipe stems or anything of that sort. There was talk about it at one time, but it is all over now.

Witness heard nothing of petroleum being discovered north of Cumberland House. It takes time to find it.

CLIMATE.

With reference to the climate, witness did not care to say very much, because he had only been in the country in the summer time, and without having taken records of temperature it would hardly do. The country was in a flourishing condition, and they never expected to have anything frozen. The most northerly point where he had seen vegetables products in Keewatin was on the Nelson river about 56, which would be 180 miles north of Churchill.

At Churchill they had winds from the southwest all summer long, which made it very warm, but there were two days when the wind shifted and came from the north,

and people wanted their overcoats at once. Then the warm weather returned. It did not freeze, but it was very cold. It was very pleasant in the summer. Sometimes there are very heavy rainfalls, but witness was fortunate in having dry summers. He had a couple of showers. However, it is not a very dry climate.

MEANS OF COMMUNICATION.

Asked by the Honourable Mr. Bernier as to whether there would be any possibility of having harbours and ports on the southwest side of Hudson bay and James bay, Mr. Dowling explained that there are natural harbours on the east side, but on the west side it would be difficult to have harbours. It is very shallow all the way through, from the southern end of Hannah bay to Churchill. There is a good harbour at Churchill. At Churchill you get to the rock. South of that, when the tide rises five or six feet the shore line changes six miles.

The salt water permeates the Hudson bay from the ocean right up to the mouth of the Moose river. Witness thought the reason of that was on account of the tides. The regular shape of the opening permitted it.

The harbour at Churchill is a land-locked harbour with rocky points on both sides, not a very wide entrance. The only complaint about it is that the entrance is too apt to be crowded with ice in the spring. The ice is driven in with the tide in the spring.

EVIDENCE OF OWEN O'SULLIVAN, C.E., OF THE GEOLOGICAL SURVEY, HEARD BEFORE THE SELECT COMMITTEE, FEBRUARY 20, 1907.

Mr. O'Sullivan explained that in 1904 he was engaged as assistant to Mr. Wilson, in examining the west coast of James bay. They went up the River Kapiscau for 150 miles and surveyed it, and found mostly swampy ground, right to about the head waters of the Kapiscau, longitude 86. His impression was that the whole coast from the southern extremity of James bay at the mouth of the Hurricane, up to Cape Henrietta Maria, for an average of 100 miles in depth, is mostly swamp country. It is partly peat and wet spagnol, wet moss. There is a bluff of small spruce here and there isolated.

In 1905 he was sent to survey the coast between York Factory and Cape Henrietta Maria. The Factory is situated on the north bank of the Hayes river, which is quite close to the mouth of the Nelson. The waters of both rivers go into Hudson bay together. Unfortunately the ice stopped him at Cape Tatnam from July 1 until July 18. He could not get along the coast with his canoe and camping outfit. The ice was held there by a north wind. The wind would take it all along the bank. It was on an average of about four feet deep at that date, from July 1 to 18, 1905. It extended as far out in the bay as the eye could reach. It was floating ice, driven by the wind right up along the bank, and very dangerous. He thought a properly constructed steamer could have broken through. It was all broken up, floating ice. It was very dangerous with a canoe. Witness had to keep clear of the pieces when the tide was coming in or going out. The shore is very flat and the tide runs out three or four miles, and sometimes he would be stuck. When he would be taking his course on distance with the chronometer, his canoe would be left dry in the mud and the tide running out. He went as far as Fort Severn. That is half way between York Factory and Cape Henrietta Maria. He left there on August 4 and could still see the ice at sea.

The shore between York Factory and Cape Henrietta Maria was swampy as far inland as he could walk in two or three days.

Mr. O'Sullivan testified that during the summer of 1906, he started from Split lake on the Nelson and made for the head waters of the Little Churchill river, going down the Little Churchill to the Big Churchilll. The country beween Split lake and Big lake is mostly swampy.

AGRICULTURE.

The country about Big lake is a good loamy soil with easy slopes surrounding the lakes. From Big lake to the Big Churchill the country is rocky and swampy with a good deal of good loamy soil in places—a rich clay loam. The rock is mostly granite and gneiss. It is very hard to find out whether it is suitable for agriculture on such an expedition. It is hard to know the extent of the soil, but the witness thought the climate was suitable. There were lots of boulders all through the country. It is possible to cultivate what there is of the land. There are places where the land extends to the size of a dozen townships, and then there would be three or four times that much without having in it enough land for a good sized township.

In the vicinity of Churchill there is grass in the valleys of very good quality. It occurs about half-way down the Little Churchill.

Good potatoes are raised at Split lake. Witness had a bag of potatoes grown there. They were rather small, but very tasty. That was in June, and they were grown the previous year. Split lake from the coast, by the Nelson, would be about 175 miles.

Witness went down the Nelson river and north to Churchill. The general character of the country from James bay further north is good, agriculturally. The country from Split lake rises to Wabishkok about 200 feet. That is about 30 miles in a straight line.

Besides potatoes, witness had seen turnips, cabbage, and lettuce growing, and all appeared to be very good. The potato vines in September were touched with frost rather severely. The potatoes were taken up on August 23 and 25, 1906.

The witness stated that he had been up near the head of Lake Winnipeg, where the river leaves the lake. There is good agricultural land around there. He never had such good potatoes as at Cross lake. He did not see them growing, but had them in June and also in September. The June potatoes would be the previous crop, and the September ones possibly the new crop. They do not grow any grain there. They have no cattle. There are no settlers in there. The Hudson Bay factor raised the potatoes. He had just enough to keep his own family. He had them in three or four different quarters. Witness saw lettuce and turnips growing at Churchill. They attempted to grow some potatoes, but he did not think they made a success of it last year, but if the potatoes were planted and taken care of they would mature at Churchill.

FORESTRY.

In his trip in 1906, the only timber Mr. O'Sullivan saw was at Split lake—spruce, poplar, white birch, from 4 to 18 inches in diameter. The country between there and Big lake is of course a swampy country, black spruce swamp, small spruce averaging four and six inches in diameter. It would make good pulp wood, and then around Wabishkok you get the same birch and white spruce and so on. They are a little larger, as large as six to eighteen inches in some places. You get isolated groves like that. The black spruce would average in the nice terraces, and level clay slopes from the lake, to about 18 inches. They grow that size and more. North of that, between there and the tree limit or the open barren ground, the country has been run over by fire, about 40 years ago, and probably, there was another fire which occurred about five years ago, so there are no trees. The moment that you leave going down the Little Churchill there are no trees to be seen on the heights except on the valleys of the river you get bunches of spruce and poplar which escaped the fire. These spruce and poplars which are in the valleys are sometimes twenty inches in diameter.

The cottonwood grows to about 14 inches. It is tall and very healthy looking. The spruce trees grow pretty long, and quite a number of saw logs could be taken out of each tree. The soil is pretty good, but the area is small. Once you leave the Big lake, all the way down there is no timber at all. In the valleys of all the streams there is timber, bunches of spruce and tamarack.

At the Big Churchill the clay hills are mostly covered with moss. It has been burned over, and you find good large spruce in the valleys of the Little Churchill river away up to about 18 or 20 inches in diameter. But they are very few. They are all very healthy looking trees. In the small scrub tree you get the limbs down to about three feet from the ground.

The northern limit of spruce is 56:47 latitude north. Beyond that you get into the barren lands.

About half way down the Deer river we come to the open barren grounds which consist of moss, averaging one to two feet thick. You meet a lot of those small lakes, and as you approach them you get this moss. You often get five or six feet of this peaty moss overlying the ice. Receding from these small lakes or ponds you come on to the ridges, which are practically all level plain. A great many of these lakes have no outlet.

The slope of the country is so uniform and gradual that there are no steep falls, and you could never develop any power. The Big Churchill is too swift to ascend.

There is a large body of water, but the river is not navigable owing to the swiftness of the water.

FISHERIES.

Split lake has been pretty well cleaned out of fish by the Indians and the Mounted Police. There are lots of good whitefish in Big lake averaging four pounds. You get sturgeon in the Little Churchill all through, some of them weighing as much as forty pounds. At the mouth of the Beaver river, about half way down the Little Churchill, the witness got fish averaging six pounds, and grey trout averaging about four pounds. All the lakes through the country are full of fish, whitefish especially. There are very good whitefish in all the lakes. There is no bad water in that country. At the mouth of the Churchill river you get salmon and sea trout, all of excellent quality. Then you get the porpoise, which is quite an item when you have to keep dogs for the winter, at Churchill.

MINERALS.

There are no minerals to be found between Split lake and Churchill. There is nothing in the rocks. There may be something north of Churchill, but the witness had not time to go there. He did not see any evidence of iron or coal between Split lake and Churchill. He never studied the country nearer Lake Winnipeg. From the head waters of Deer river to Churchill there is a silurian limestone.

MEANS OF COMMUNICATION.

Mr. O'Sullivan considered it would be easy to build a railway through the country. The character of the land is all right until you meet the red clay hills, where he left the Great Churchill at the junction of the Little Churchill to get to the headwaters of the Dee river. There are hills rising from 100 to 300 feet above the level of the Great Churchill river which have to be crossed. He did not see any seriously difficult point in getting a good line of railway from Spit Head to Churchill.

EVIDENCE OF WILLIAM McINNES, M.A., GEOLOGIST, OF THE GEOLOGICAL SURVEY, GIVEN BEFORE THE SELECT COMMITTEE, FEBRUARY 20, 1907.

Mr. McInnes stated that he has been employed in the Geological Survey since 1883. The regions in the west with which he is familiar, first the district between the Saskatchewan and Split lake on the Nelson, a country which he was over last summer, and secondly, the region lying between the west coast of Hudson bay and the northern part of Ontario, Lake Nipegon and the Lake of the Woods.

The whole region from Split lake to a line of about 40 miles north of the Saskatchewan is a clay covered country.

The witness passed through this country, went by the Burntwood river and came back by part of the Grassy river, and made a number of excursions inland between these two rivers. After leaving Split lake, ascending the river, this clay-covered country shows absolutely no boulders and no gravel. Even the shores of the lakes, until you reach a height of about 800 feet, show no gravel bars at all.

There is absolutely nothing to interfere with the cultivation of the soil there. It is a country that has been burnt over. Witness assumed that the Burntwood river got its name that way. It has been subject to repeated burns. At the present time it is covered by a very open forest. Grasses grow fairly luxuriantly. There are two species of this, blue joint grass and a wild rye, that are the prevailing grasses. He understood, though he is not very familiar with those grasses himself, from Professor Macoun, that these are very excellent meadow grasses and make excellent fodder.

Mr. McInnes left Norway House in the second week of June and made the circuit and came out at the Pas on September 6, so it was June, July and August he was there. He saw grass growing from eighteen inches to two feet high.

The witness computed the area of this country at about 10,000 square miles. He does not mean to say that all of that ten thousand square miles is good land, but the basin characterized by this deposit of clay has an area of about ten thousand square miles. It is bounded on the north by the Churchill river. The witness was at about the centre of the basin. The Indians told him it extended north to the basin of the Churchill river. Beyond that, northwards, instead of clay you get sand and gravel.

Starting at the Pas and proceeding towards Churchill the witness first passed through about 140 miles of country underlayed by the flat limestone of northern Manitoba. He walked for miles over hills of almost bare limestone with hardly any soil. Beyond that—that is above the contour he had spoken of where this clay was deposited, there is about 170 miles to Split lake, possibly in a straight line about as the railway is projected, that is characterized by these clay deposits.

AS TO THE FLAT COUNTRY.

As to the flat country in Keewatin, beyond this clay area, it is a country of a different character. The witness proceeded from the Albany across country by the portage route to a large lake on the Agnooski river 100 miles, and then another 100 miles across to the Winisk lake and down the Winisk river to the sea, and he crossed through the country between Agnooski and the Winisk by three different routes, perhaps 40 or 50 miles east and west between each route, and the country is very much the same character. It is a country that is very much denuded; that is to say, the original archaic rocks have been worn down to almost a plane. The elevations are very moderate. The only elevations to be seen are of glacial origin. They are old boulders and gravel. The

country generally is characterized by these hills of boulder and gravel and intermediate valleys very largely muskeg. Except in the immediate valleys of the larger rivers there is very little land that would be suitable for agriculture, very little indeed, and that is a characteristic of the whole country Mr. McInnes was over; that is of the upper waters of the Agnooski and the Winisk rivers and down to about 150 miles from the sea. From the point specified, down to the sea, the country is of an entirely different character again; that is to say, it is country that is originally overlain by from a very few feet at its edge, to 100 feet or more, of boulder clay of a very tough impervious boulder clay, which holds up the water, and on which the drainage, up to the present time, is of a very imperfect character. The present drainage of that area is comparatively recent.

There is overlying this boulder a marine clay which holds very well defined marine fossils, some of the shells quite as well preserved as you will pick up on the seashore to-day. The witness picked up some of these species which showed that subsequent to glacial time that country up to the 450 foot limit was down in the sea.

A GREAT KEEWATIN RIVER.

The present drainage has only had since that time to work itself out, and has not yet become very perfect. An instance of that is seen in this Winisk river. There is a lake under the head of the Winisk from which the main river flows, and from which the west branch flows north. They come together at a point, following the main stream, 250 miles below, enclosing an island 250 miles long. There are two other islands of this character along the Winisk river, one 80 miles and the other about 50.

It is a good large river. Mr. McInnes estimated it in cubic feet per second, some 25,000 cubic feet per second. It runs in size somewhere between the Gatineau and the Ottawa, not as much as the Ottawa quite, but larger than the Gatineau. Over the whole of the country, the last 150 miles down to Hudson bay, granting the proper climate and granting proper drainage, this green clay would make an excellent soil. In fact it is quite the same as the clay in the vicinity of Ottawa, practically clay of the same soil. It is very impervious clay and the country is extremely fit, except for the moderate slope down towards the bay, and it occurs in east and west undulation, so that there is no drainage except by the larger rivers down to the bay. There are little streams running into the sides of the river, but they cut very sharp walled trenches, sometimes 80 feet, as steep as boulder clay will stand, and that means an angle of say 60 degrees, 80 to 90 feet high. You get on top of these banks and you have a mossy place, sometimes 6 feet of moss. It is never peat; never having turned into peat. It is simply a green moss which is pressed into layers of a couple of feet thickness at the bottom of the 6 or 10 feet, but never apparently oxydized or never carbonized at all, practically unchanged. The growth is going on still. It is merely the successive layers which are pressed down by subsequent layers on top of them, so that in places the thickness is quite ten feet. The first week in August Mr. McInnes got down to the sea coast and spent a month there. There was an ice barrier when he reached Hudson bay, off the mouth of the Winisk river. It had grounded about five miles out. It is very shallow water. It extends out four or five miles exceedingly shallow, the large boulders sticking out in high water. In low water there are extensive mud flats running out four or five miles from the shore, and the company's fishing boat had to make a circle of eight miles out of the bay before they could run up the coast.

AGRICULTURE.

There are no grasses in that mossy district in the valley of the Winisk. A river of that size in places has some shores, perhaps a quarter of a mile, here and there, beyond the actual shore of the river, and it is grassy there. That is, there are occca-

sional bottom lands, but there is no extent of them The witness did not think there is an agricultural country in that eastern district. It is is entirely different from the country he had been previously speaking of.

Upon the Nelson river wheat has been grown successfully at Norway House, and also at Cross lake. Of course, he could see that they grow no grain at any of their posts nowadays. In the old days they grew it and ground it in hand mills. Witness saw potatoes that where grown about 50 miles north of the Pas. There were quite showy potatoes, great large fellows like those you see exhibited in fairs—tremendously large, grown on practically new land, and they had a very large crop of them. Mr. McInnes did not eat any of them. The Nelson has its source within forty miles of the Rockies.

There are no settlers in the Nelson district. The Indians, however, grow potatoes at several points, even in the northern part of it, as far north as Nelson House, about latitude 55. On July 11, when the witness arrived at Nelson House, the Indian potatoes had vines about eleven inches high, and were almost ready to flower. When he got out on September 6 to the Saskatchewan, at the Hudson bay post there, at the Pas, Indian corn was very well headed out, with very large fine ears quite ready for table use, and there was no frost until September 29. He knew that because he stayed there until then.

With eighteen hours of the day light, and no frost in the summer, vegetation is rapid. In a country where you can ripen Indian corn you can grow practically anything.

Mr. McInnes drew the attention of the committee to the fact that there is a very large area immediately adjoining the Saskatchewan river from a little this side of Prince Albert, clear down to the mouth of the river of very swampy land. In fact for a long time they thought they could not build a railway in to the Pas on that account. It occurred to Mr. McInnes going down that stretch of country that the only thing that has prevented the Saskatchewan draining this area is the occurrence at the mouth of the Saskatchewan of what is known as 'the Grand Rapids,' with a fall of 100 feet. This fall is in length a distance of about 3½ miles or thereabouts, and Mr. McInnes suggested that there is a possibility that these marshes might be done away with by blasting out the rock, thus increasing the speed of the river and lowering the basin of the Saskatchewan and draining that swampy country. It would bring into cultivation a great many thousand square miles of as fine land as could posssibly be found. It is all alluvial land of the best possible character.

FORESTRY.

The western part of Keewatin has evidently from all accounts been a country of good timber generally, but unfortunately it has been almost all burned over, and burned over a good many times, so that at the present time the only areas of good timber that the witness knew of are the area north of Moose lake, the area west of Clearwater lake, and the area between Cormorant and Yarnstone lakes. He made cross sections in that country several times, and he found white spruce, and the largest tree he found was 30 inches in diameter. That was the largest tree. He would say most of those trees make three 14 foot logs because they are growing thickly, and it is a regular white spruce timber limit. There are a great many from 10 inches up to 23 inches. That is an area about six miles long by two or three wide, and going through that there are areas of swamp. He cross sectioned through it and would come to a quarter of a mile of good trees, and then perhaps half a mile of swamp land with black spruce, and half a mile of good trees right across. North of that point there are only a few isolated areas of timber that had escaped the fire. On the islands and lakes there are pretty good timbers, and on some little peninsulas that are nearly cut off; otherwise it has all been burnt.

At Nelson House, in order to do some building, they had to go up the river some ten miles and pick out a log here and there before they got enough to put up a house. There is a great deal of timber that would be fit for pulp wood. The black spruce which grows to 8, 9 and 10 inches, covers practically the whole ground. Where it has had thirty or forty years' growth it gets up five or six inches through, and it is a very peculiar timber. The yearly growth is very small. It is packed very closely together, and it would make excellent timber. It would yield more fibre than the average stock.

There have been a great many fires up there. Timber of large enough size to saw into deals and boards, such as are used in building, is confined to within a very few miles. The missionary priests at Albany go to church at the mouth of the Winisk, and the church is constructed from lumber that they sawed from trees cut a few miles up the river. In the swampy portions of course, it is entirely black spruce and tamarack, and generally small size, 6 to 8 inches. A very great deal of it would make pulp wood, and on the drier ridges of boulders and gravel there are white birch and poplar, but these are not of any commercial value. The northern limit of white pine is found just about the Albany river. The northern limit of spruce is reached at Winisk lake.

FISHERIES AND GAME.

All the larger lakes of this country abound in very good whitefish. The lakes within convenient distance of the Saskatchewan have already been commercially fished. It is extraordinary how far they have been able to haul those fish out. In the winter season they haul them one hundred miles. There are two companies carrying on the fisheries. One has headquarters in Winnipegosis, and the other at West Selkirk. One of them is the Dominion Fish Company, and he thought the other the Northwest Fish Company. They have privileges from the Dominion government, and they fish under license, it being in the territory outside of Manitoba and the new provinces, which has not yet been assigned to any other province.

The companies hope this winter that the new railway will reach the Pas and one of the companies is putting an extensive plant in the lakes near the Pas hoping to send out the fish by rail, but they had already fished those lakes and hauled their fish in the winter all the way down to Winnipegosis and across Cedar lake, over 100 miles. Chicago is the market. The principal fish are whitefish and lake trout.

There are many other lakes in that country which contain valuable fish such as the witness described. Split lake, for instance, is about 30 miles long by three to eight miles in width. If that country were opened up by railways there would be a considerable business in exploiting the fisheries, because the sturgeon is valuable. They would get the sturgeon on the Lower Nelson and part of the Churchill. The companies put on steamers on these various lake expansions on the Nelson, so that they reached down to within a few miles of Split lake, and marketed sturgeon in that way. They put tramways on all the portages. They ran that way for a couple of summers, but the distance was too great and it did not pay.

The larger lakes have a very good whitefish and sturgeon. The head of the Adawadskit was particularly full of sturgeon. Going out Mr. McInnes' party was short of pork and stopped one day to get supplies. In one night's fishing the Indians caught so much sturgeon that they had enough to carry them for 150 miles to the Hudson bay post. One of the sturgeon was three feet long.

At the mouth of the Winisk the Indians were catching speckled trout and whitefish in very large numbers. In fact the Indians of all that interior country live on fish. They smoke and dry them to a limited extent, and late in the autumn catch them before the larger lakes are frozen over, when the temperature is low enough to freeze the fish. They catch enough to put by for the winter. The fish are sent to Chicago frozen. It is only in the winter season they have that trade at all. They fish the

nearer lakes all summer and only reach the far away lakes in the winter. They have large ice houses and regular freezers for the summer trade. Ordinarily on those lakes they are able to pay on an average about four cents a fish, or about two cents a pound. The Indians catch fish and sell them to the companies, but they have complained sometimes of the fishing companies going in there. The Indians are not interfered with by the companies as to the catching of fish for their own use, but they claim that the Indian cannot sell to any one but the companies having the leases. The companies are very glad to get the fish. The companies make their own bargains with the Indians.

As to the fisheries of Hudson bay, the witness only knew from his own knowledge that at the mouth of the Winisk they were only catching river fish—speckled trout and whitefish. Porpoise were very plentiful about the mouth of the river, but he saw no other fish. He did not think there were any salmon on the west coast of the bay.

Ducks were fairly plentiful. The geese do not nest in that interior country. They do down along the coast. Witness knew by the descriptions that there are a great many lagoons lying just inside of the shore, along the west coast, where ducks and geese nest in countless thousands. The wild geese live on all sorts of little shell fish, water beetles and crabs, and many seeds of water plants, other than wild rice. He remembered shooting mallards in that country, and their crops were full of little bivalve shells about the size of his nail. The geese are not fish-eating to any extent, and neither are the mallard ducks, still they will eat shell fish.

MINERALS.

Mr. McInnes explained that the forty miles of limestone he spoke of as having passed over north of the Saskatchewan is an excellent stone for building purposes. It has a large proportion of magnesia, perhaps 45 per cent. But it occurs in regular layers and can be got out in thicknesses from a foot up to six feet and in blocks of any size.

There are only two or three belts of what is known as the Keewatin rocks. These are the rocks which in Western Ontario hold gold. The witness found no minerals in commercial quantities. He found traces of copper on File lake. At Cross lake there is an area of these Keewatin rocks cut by intrusive granite of the same character as the photogene of western Ontario, which are almost always gold-bearing, but nothing has been found there. The limestones would make excellent building material. There are some intrusive granites on Grassy river which are of fine texture and beautiful red colour, which would make very fine monumental stone, trimmings for buildings, &c., and would quarry very well. That would be along the projected line of the railway.

There is no possibility of coal there. The rocks are below the coal horizon.

Some man at the Pas has discovered coal oil not far from the Pas, on Pas mountain. The witness saw some of the bituminous shale that was quite impregnated with bitumen, so much so that when some of it was submitted to a professor in Manitoba, he thought it was rich enough to extract it commercially. That is south of the Saskatchewan, however. That is quite an overlying formation which does not extend to the north at all.

An occurrence, that seemed to witness to be of particular interest, was his discovery on the upper Winisk river of a large area of so-called norite rock. That is the rock in which the nicked of Sudbury occurs. It is quite a characteristic rock. Mr. McInnes examined samples under the microscope, and they are not to be distinguished from the other. That leads him to hope that there is a possibility of nickel occurring there too, but he did not find any, although he examined as well as he could. But he had not much time, and was too far way. There are two, or three areas of these Keewatin rocks occurring unfolded in the Laurentian, but Mr. McInnes found no min-

erals in economic quantities in them at all. Near the Eadmet river, a tributary of the Albany, he saw crystals of mica in the granite, two and a half inches in diameter. Of course that is not large enough to amount to much, but it shows a possibility that there might be something better there.

When Mr. O'Sullivan spoke of limestones down the lower parts of these rivers, he referred to limestones of the Hudson bay basin, which run perhaps forty or fifty miles up these rivers. There is quite another basin on the other side, the intervening land being archaean, which if they had ever been covered with limestone, of which there is evidence now, the limestone must have been entirely eroded away. Those limestones would furnish building material and could be burned into lime.

CLIMATE.

Mr. McInnes said he could not very closely indicate the isothermal line on the part of the country he had explored last year, but he could say that that country averaged from four to five degrees in the summer months higher temperature than the same latitude further west. He thought that the isothermal line which would go past the north end of the country he had been speaking of would come down as far as the north shore of Lake Superior, which would be a very long distance south. He had records kept during all summer of the temperatures through that western country, and he had a summary of the record kept in the preceding summers.

He was rather surprised at the warmth of that western country in summer. He was surprised at the way heat kept up in the evenings. He kept the thermometer readings morning, noon and 6 o'clock in the evening, and found the 6 o'clock temperatures were almost as warm as the noon temperatures. That country has a very long day in summer. The day in those high altitudes is very much longer, and the growing time proportionately longer. In June they have about eighteen hours of daylight.

As to the district where he found the 170 miles of agricultural land he had described, he only reached there about the middle of June. There was no frost in the balance of June or in July, and no frost in August, excepting once, on, he thought, the 29th, when the thermometer dropped just to freezing point. There was not enough frost to touch vegetation at all in the valley of the river where he was. He noticed when he got out to the Saskatchewan there was rather a high ridge on which there were a lot of half-breed settlers. He got there on September 6 and noticed on top of the hills where they had potatoes that they had been touched just on the tops, but down in the valleys the potatoes in the garden of the Hudson bay post had not been touched at all. He presumed that frost was on August 29.

The witness had often been over the Canadian Pacific Railway between Lake Nipissing and Port Arthur, and the country he had traversed from the Pas eastwards as compared with the country north of Lake Superior was much superior.

SETTLEMENTS.

There are a few half-breeds and Indians settled at the Pas, and there are the two Hudson bay posts spoken of. Apart from that, there are no settlers in western Keewatin, just wandering Indians. Of course, there are a great many Indians there.

MEANS OF COMMUNICATION.

The proposed railway through the Pas would go through 170 miles of tolerably good land, and of course there are areas of swamp.

The proposed route runs not quite through the centre of the fertile country described, a little south of the centre, but pretty yearly through it. It would necessarily have to cross the limestone ridge of which he spoke. It has to go about 40 miles before

it gets off the limestone. It could not escape the limestone by swinging to the north or south. It is very flat country with very moderate undulations. There is no difficulty about building a railroad over it. Near the Saskatchewan and Split lake there is a gradual fall, perhaps 280 feet in all. That is the difference in level of the two points; but there is no point intermediate between the two that is any lower than 180 feet above the level. Generally it is extremely level.

The witness being questioned by the Hon. Mr. Power, said that he was not very certain about the derivation of the name Pas. His impression was that it meant the threshold, the step in the sense of being the gate or threshold of the country. It is one of the earliest posts the old French company established. They established one there and one at Cedar lake before the Hudson Bay Company went in there. It was the French who christened that place.

The distance from the Pas to Split lake is about 250 miles, and from the Pas to Fort Churchill about 480 miles or thereabouts.

As to the suggestion to blow up the rocky ledge at the mouth of the Saskatchewan, Mr. McInnes was asked if it would injure the navigation of the river. He replied that there are some steamers on the river, but he thought if his suggestion were carried out it would improve the navigation, because it would confine the water to one channel. If that improvement were made a railway could be run down the valley; at present it would have to go some distance back, because the country is exceedingly swampy.

EVIDENCE OF HENRY ANTHONY CONROY, OF THE DEPARTMENT OF INDIAN AFFAIRS, INSPECTOR UNDER TREATY NUMBER EIGHT, HEARD BEFORE THE SELECT COMMITTEE, FEBRUARY 25, 1907.

Mr. Conroy stated that he had been annually travelling through this northern country for about eight or nine years. He starts in along the Athabaska river, from Athabaska Landing, which is about 100 miles from Edmonton, and goes up the river to the junction of the Little Slave river, thence visiting all the Indian reserves in the treaty district.

AGRICULTURAL LANDS.

Mr. Conroy explained that the banks of the Little Slave river are flatter than those of the Athabaska. They are not high. Say from Moose river, there is some good agricultural land, some open country. In fact in the opinion of the witness, the most of it, when the timber is cleared off, will be all good for agriculture. When you get up to the southeast end of Lesser Slavé lake, the country around there, up to the valley of the Swan hills, is a beautiful country, some parts of it heavily timbered, while other parts are open. Mr. Conroy drove through there last fall. There is some prairie and some beautiful grass. The finest grass in the world grows there, blue top, some of it six or seven feet high. He drove through hundreds of acres of it last fall that was at least six feet high in most places. It has a regular river bottom, and the Swan hills are back about twelve miles from the lake. The basin all the way around the lake is a beautiful country in the opinion of the witness.

THE BLUE GRASS COUNTRY.

The blue grass grows on the high land—blue joint as they call it. It will not grow in sloughs. It is very good grass. It does not generally grow on damp lands. You can get land up in that country where there is no sod in it. You can kick the sod right up, and you can get hay just as thick as it can stand. Witness would not be surprised to learn that four tons an acre could be got off the land, from the looks of it. This grass cures standing in some places, but the great trouble is that year after year it breaks down and the other grass grows up between it, so you could not cut it very close if you wanted to, because there is the old hay at the bottom. Where some of the pioneers cut the hay they burn that portion off, and in the spring it grows up clear, and they can mow it with machines. There is a good deal of open country in that district all around the south side of Lesser Slave lake.

When you get up about 40 miles north of Lesser Slave lake, between that and Whitefish lake, about 44 or 45 miles, there is 20 miles of a rolling prairie country, which appeared as though it had at some time been burnt and the poplar timber burnt off. The feed on the bunch grass there is excellent, and the hills all slope to the south. The opinion of the witness is that it is one of the finest pieces of agricultural country in that district.

Sturgeon lake is about 110 miles southwest from Whitefish lake, which has a wide fringe of low ground. In high water Mr. Conroy had seen it covered with water, but the last four or five years the water has been low in that country, and this low country has been covered with hay. It is not the blue joint grass nor is it the bunch grass; it is another species of hay. Witness did not know what to call it, but when cut it made good hay, and it grows about two feet high and just as thick as it can grow through

that country. There is an Indian reservation at that end of the lake, some 9,000 acres, and a little river called Sucker creek runs through it. On the banks of that they can grow anything. The witness saw the finest potatoes and vegetables there that he had seen in his life.

A little further south and west lies the Prairie river country, and that is the finest piece of the Northwest Territories Mr. Conroy had seen. It is partly open, most of it open for quite a few miles, and nice bluffs of timber, mixed, some spruce among it, and some poplar. But the most of it is level and open. No bunch grass grows in it. It is the blue grass of the country, and the drift pile runs right up. Witness was never far up on that, only just a few miles, but the information he got from some of the Indians and the pioneers there, was that it runs to some considerable distance south of where he had not been.

There are two Indian agencies right on Lesser Slave lake. They raise potatoes, vegetables, barley and oats, and they grow wheat. That district would be about the 56th parallel of latitude.

At Sturgeon lake there is an Indian reservation, although it is not surveyed yet. The Indians refused to have it surveyed two or three years ago, but they are very anxious to have it surveyed now. There will be about sixteen thousand acres due the Indians around this lake. It is very fair agricultural country, good ranching country, lots of good water and lots of good hay.

From the Sturgeon lake and Prairie river, towards the Little Smoky river, after getting out of the Prairie river valley, there is a ridge of timber which is not much good for anything. It is small brush, and witness would suppose that the ground is cold. It looks to be a kind of white clay. If it is moistened it is a kind of gummy. The timber on that ridge runs through from the Prairie river valley south. After you cross that again you come into a section of low country, some of it open, with a small river called many names running northeast to west. It is only a beaver country. That is a great hay country. The witness saw a beautiful blue joint grass growing there.

THE PEACE RIVER COUNTRY.

Between the Little Smoky river and the Lesser Slave lake the country is open. Along the banks of the Little Smoky the spruce grows very large, the largest of any until you come to the Peace river.

The timber on the banks of the Smoky river is tall. The banks of the river are seven or eight hundred feet above the bed of the river. The banks of the Peace are a thousand feet high, and this part of the smoky is not very far from the Peace river. The banks of the Smoky river go in benches. You go a hundred or a hundred and fifty feet on the level, and then down a bank and strike another bench. So you go down from one bench to another until you get to the river bed. It is a nice easy country to make roads in. The soil is good. There is no rock in that country. The highest bench would be probably a mile and a half, maybe more, from the river.

When the Peace river district is reached, via the route taken by Mr. Conroy, the altitude is very high, probably higher than it is at Edmonton. It is certainly over 1,000 feet from the top of the bank down to the bottom of the river—tremendous banks. The country, as witness understood it, is very fine. Bunch grass grows all along the north side clean through to the Hayes river. He had information as to this country from Indians and half breeds, and they say bunch grass grows all along the way. Shortly after striking the Peace, Dunvegan is reached. On the south side of that is the Spirit river country that witness had already described.

This country north of Dunvegan, all along the river, is in the opinion of Mr. Conroy, fit for agriculture on both sides and for any distance back. Of course, you have to go up to the top of the banks to get the land. Fine buffalo grass grows in the district north of Dunvegan up to the Peace river crossing.

Along the Peace river near Peace river crossing, there is a fringe of timber most of the way, but it is not very wide. As to the country running across from Dunvegan to St. John, it would not take a man very long to cross it if he had a road. The foot hills of the Rockies begin very near Hudson's Hope.

MR. MACOUN'S EVIDENCE.

The witness stated emphatically that he is of opinion there is a large area of valuable agricultural land on the Peace river. Taking the whole country there, as far as he knew, there is as much agricultural land to be settled as there is settled at present west of Winnipeg.

In reply to questions, the witness said that this was the very country that Mr. Macoun had spoken of disparagingly before the Agricultural Committee of the House of Commons two years ago. Witness said he most certainly disagreed with Mr. Macoun. He was there in that same country at the time Mr. Macoun was. Mr. Conroy said he thinks Mr. Macoun got wrong information.

Hon. Mr. PERLEY.—'He spoke from his own knowledge.'

Mr. CONROY.—'He did not have proper knowledge. I was through that same country that spring, and it happened to be a very wet spring. The farmer he speaks of had not a grain in up to May 20. That I can swear to. In fact he could not have put it in before June 6. That is the year it froze, and it has never frozen since. Old timers in there do not want anybody to come in, and they tell people that the country is no good. That is what they told Mr. Macoun. They have the whole country to themselves. One man grows 2,000 or 3,000 bushels of wheat every year and gets for it from $1 to $1.75 a bushel from the Hudson Bay Company, and he does not want anybody else to come in and compete with him.'

Hon. Mr. FERGUSON.—'Mr. Macoun said you strike a hard pan there?'

Mr. CONROY.—'That is in the country where the altitude is high. There is hard pan in every part of the country. It runs close to the surface at that particular place, but I can take you to a place not very far from Ottawa where you can get hard pan on the surface the same way. That probably dips two or three miles further on and goes down deep.'

'How far north of Edmonton is that?'

'About 700 miles by the trail. It is about 350 or 400 miles in a direct line. We have to take an indirect course in order to touch the different reserves. It is about 5 degrees of latitude north of Edmonton. The river broadens out as you go east and north.'

Continuing his evidence, Mr. Conroy explained that from Vermilion northeasterly you are out of the agricultural country, but below that it could be made an agricultural country. There are no settlers there at all.

There is some good country up along the Clearwater—very nice country from an agricultural point of view.

The CHAIRMAN.—'As to the whole of this Peace river country, you ought to be in a position to know whether the country is fit for agricultural purposes or not. In your opinion is that country good for agriculture?'

Mr. CONROY.—'Yes, I consider it as good as any settled. As I told you, there is just as much there to be settled as there is now settled west of Winnipeg.'

THE NORTHERN DISTRICT.

Mr. Conroy remarked he was down at Fort Providence at the mission five years ago. They have a splendid farm about latitude 62·30, and Mr. Conroy saw beautiful crops of wheat, oats, barley and peas. He left there on July 28, and their barley was fit to cut, and they were cutting it. Their oats and wheat would be ready to cut in a

day or two from the looks of it, and the priest later told him all their grain was cut without a bit of frost. July 28 is very early to harvest crops, but you would not think so up there. They have lots of sunlight. One could sit out all night and read. The altitude is low, and you can see the reflection of the sunset and sunrise. The witness was not far enough north to see the midnight sun. They can grow all kinds of wild fruits in that country, but not apples. The witness got very fine strawberries at Fort Providence, and there were raspberries, blueberries and cranberries also. The furthest north witness had seen apples was at Edmonton. They might grow further north.

FORESTRY.

Down the Athabaska river from Athabaska Landing to the junction of the Little Slave, the banks of the river are fringed with timber, probably from half a mile to two miles wide. Witness did not think it is more. The spruce is fairly large in some districts—fit for sawlogs, and mostly all fit for ties and small building timber. Some of it was very large spruce for that country, three feet across the stump. There is an Indian reserve along the Little Slave river, and a portion of that has good timber. The Indians have the finest piece of timber on the Lesser Slave lake as a reservation, the spruce is large, and there is a species of poplar, what they call the black-bark poplar, which grows very large there. Witness had seen it from three to four feet across the stump. It grows very large, and sometimes fifty to sixty feet high on this low land. The north side of Lesser Slave lake is covered with quite a heavy second growth of poplar, some spruce, but not very much, and the poplar is not very big, probably from nine to twelve inches through, and grows very slim and tall. It is very long, just a little bunch of limbs at the end of it, and the trees grow close together all along the north side of Lesser Slave lake.

When you get back about half way between Lesser Slave and Whitefish lake, you strike a timber belt running from that to Whitefish lake, and there is some spruce and a great deal of poplar. Witness had seen spruce logs there two feet through, a great many of them in that section of the country.

After leaving the Prairie river valley to cross over to the Little Smoky, you do not meet any timber until you come towards the Little Smoky river. About nine miles in width from the Smoky there is a timber belt probably 25 or 30 miles long, from information witness got from the Indians, and eight or nine miles wide, going through it, mostly spruce and black-bark poplar.

The country lying due west of Sturgeon lake, between that and the Big Smoky is, some parts of it, muskeg, but there is a lot of very good land too and some very good timber, and along the banks of the Big Smoky there is some excellent spruce.

Mr. Conroy never was there, but the Indians told him that on the east side of the Smoky there is quite a big limit of timber. Most of it is spruce, and in the low land tamarack, so that there is quite an area of timber along the Big Smoky.

After leaving the Puskopee prairie going to the west there is no more open country, but there is a timber country right across to the Pine river. The banks of the Pine are very high, higher than the banks of the Smoky. Witness thought they were about as high as the Peace. They commenced away back, and the timber all along on the steep banks is very high. The belt of trees appeared to him to be wider along there than anywhere else, between six and seven miles wide in the part he went through himself. It runs right through a bald hill where it enters the Peace.

The south side has the trees. On the south side of St. John's in British Columbia, between that and the Peace, the country is not much good. It is a very high country. There is some timber, but not of any economic use, mere brush. On the sides of the banks it might be of some use.

Witness had been 13 or 14 miles north from Dunvegan on the Peace, and found timber growing pretty large. There are groves in that country through which a man

could drive a mowing machine, the trees are so far apart. One would think they had been planted there.

Witness had never been in the country south of Lake Athabaska, but as far as he could see it looked to be well timbered. He had been east of Lake Athabaska as far as Fort a la Corne. All along the river there is good timber, down the Great Slave river.

On the lower levels of the Athabaska, clean through to Athabaska lake, there is heavy timber all the way along. Witness does not know what is behind the timber belt, but believes it is pretty muskeggy. That is what the Indians told him. He had been up the river by boat every year for eight years. Taking the country as a whole, there is quite a lot of marketable timber. All the rivers and lakes could produce good timber. There are millions of cords of spruce for pulp wood.

There is a beautiful water-power on the Peace river, and there are ninety miles of rapids on the Athabaska from Fort McMurray to Pelican portage. There is all the water-power that could be desired—tremendous falls.

FISHERIES, GAME AND FUR-BEARING ANIMALS.

Along the Peace river from Vermilion until you get to Lake Athabaska there are low rocky shores without timber, but the waters are full of fish. Immense quantities are taken every year. There are whitefish, greyling, pike and many other kinds, but no sturgeon as far as the witness knew. At the east end of Lake Athabaska there are Indians. The Indians all through this country make their living principally by hunting and fishing. The principal varieties of fish are trout and whitefish. Witness had seen trout weighing twenty pounds. These lakes are full of fish. Twenty-eight, thirty and forty pounds are common weights for trout. That is just the 'whitefish trout.' They have a salmon trout, a whitefish trout and a rainbow trout up in the mountains. There is untold wealth in those lakes. In the northern waters they have whitefish, herring and trout. There is nothing done commercially in the matter of fishing. The Hudson Bay Company do not feed the fish to the dogs. Witness thought that if there were more fish taken out of the lakes it would be better for the fish. The fish got better after a quantity was taken out. The Indians dry some of them. They can smoke a fifty pound fish and dry it. The Indian will cut up his fish in the summer time and dry it.

The reindeer go as far north as latitude 60. They have been coming to Lake Athabaska for years. They did not come last year, and there was starvation among the Indians there, but that is the first time in the remembrance of the oldest Indian in that locality that they did not come that far. They come in countless thousands. The Indians stand in the lodge doors and shoot them as they run around. The animals have not any fear.

There is also moose in that country and musk ox.

The country which lies in between the Peace river and the south shore of the Great Slave lake, Mr. Conroy had been told by the Indians and half breeds, is a buffalo country. He had not been more than three or four miles back in it himself. He was told that there is a bunch of wood buffalo in there yet. It would take a man on horseback five days to cross that prairie.

The Indians and half-breeds told Mr. Conroy that the country between Great Slave river and Hay river is covered with buffalo grass, excepting a little timber that grows in a fringe around Great Slave lake. He had information from Indians living in that country that it is an open country covered with prairie grass.

North of Great Slave lake there is a bunch of buffalo that have been there, the Indians say, for fifty or sixty years. The Indians claim that buffalo grass grows in there clean up to the Yellow Knife river. Asked if the buffalo were increasing, Mr. Conway replied that he thought not. The wolves have been very bad for the last five or

six years, and the Indians claim that they kill the calves. Witness thought that there were somewhere in the neighbourhood of three hundred and fifty buffalo. That was approximately, of course. He got a specimen for the Department of Agriculture last year to be mounted. The Indians got it for him. This herd are the only wild buffalo on the continent, he believed. They are very large, much larger than the plain buffalo. One old Indian told the witnesss that years ago they found a herd of buffalo between the Liard and the Hay river, and one time they got a herd of them at Fort Providence, and they slaughtered all that were in there.

There has been a close season for buffalo for a good many years. The skin of the buffalo that the witness procured for the department was a tremendous size, and he would say the animal must have weighed fourteen or fifteen hundred pounds.

You do not require to enforce the law to protect the buffalo. The Indians will not kill them. They want to preserve them as much as any one else. They are the Wood Cree Indians in the country north, as far as the sixtieth parallel, and the Chippeweyans north of latitude sixty until you come to the Aleutians or Esquimaux. The Indians think if the buffalo are gone they will have nothing left. The Crees are benefiting by the errors of the Indians south of the Saskatchewan. They know that the buffalo are all gone south of them and want to protect the wood buffalo. The government is giving a bounty for each wolf killed. Not many have been killed yet. The Indian does not like to kill wolves because of some superstition, but the half-breeds will kill them. Witness saw a couple of those timber wolves a couple of years ago. They were very large. These wolves never go in packs. They generally are in couples, but you sometimes see three of them together, and that is the most you see together.

The musk ox is not becoming exterminated as the buffalo is. There are lots of musk ox in the country. They will take care of themselves. You cannot follow them. The Indian cannot go very far into the muskeg, and they do not follow the musk ox any distance. They get them at the end of Lake Athabaska sometimes, but they have not been killing them since the close season started two years ago.

MINERALS.

The minerals lie in the country east of Lake Athabaska. It looks to Mr. Conroy just such a country as the Lake of the Woods ,the same Laurentian range, a kind of reddish grey granite with strings of white quartz running through it. If there is anything in the quartz, there is lots of it there. The same way with asphaltum, if it is any good there is lots of it.

Some gold was discovered up near St. John's a couple of years ago, just below St. John's, near Mud creek. Then there is the gold sand on the Peace river.

Asked if there is much coal in the country he had travelled through, Mr. Conroy replied that there is coal everywhere, both on the Athabaska and on the Peace. Coal is plentiful. There is coal also in the Liard country and gold also. The coal is good for fuel, and burns well.

There is a salt mine at Salt river. The salt is as white as snow. It is right at the northern boundary of Alberta.

In reply to a question, the witness said he had been to Fort McMurray many times. He went up the Athabaska to McMurray. He saw en route timber, coal, asphaltum and oil, the best oil country he had ever seen. Some places you can see it leaking out of the bank. The banks are very high there. He had been right to the top of this bank and it is all asphaltum. He could not figure out the extent of it. There are miles of it.

CLIMATE.

Asked by the Honourable Mr. Ross, of Middlesex, how the climate in the Peace river district compared with that at Edmonton, Mr. Conroy replied that it is about the same.

The Chinook winds are felt as far north as Lesser Slave lake. He had gone through that country once, when for twenty-one days in January you did not need your coat in the middle of the day. The cattle were all out in the pasture fields. He had been going in there every year for eight years and had been there for five winters.

Mr. Conroy stated that he never saw a very deep snowfall in that country. He felt pretty sure that the Chinook winds go through to Athabaska lake.

The witness testified that in that country in the winter he did not suffer as much as he had suffered from cold in Ottawa, and he slept out every night, sometimes under a tent and sometimes in the open. He travelled once with a dog train and afterwards with ponies, and got along very well with them.

Fifty below zero was the coldest witness had ever seen up there, and that only once seven years ago.

In the spring, as a rule, the ice breaks up on Great Slave lake about July 1. The ice floats around in the northern part of the lake all the year round. The lake freezes up again about October 15. It is open from July 1 to the middle of October. In Lake Athabaska there would be a slight difference, but not a great deal. The witness had seen the Athabaska broken up on June 24. It would be open from June 24 until probably October 15.

The summers are very fine.

SETTLEMENTS.

At Athabaska Landing there are quite a number of settlers who are doing very well growing grain. They have been quite successful. At Vermilion there has been a settlement for fourteen or fifteen years. Mr. Conroy said he had been there many times, and knew all the settlers in that section. Some of the finest wheat he ever saw he saw growing in that settlement. He only saw it after it was harvested; it was threshed. They have a roller mill there, an up-to-date mill. The Hudson Bay Company manufacture flour to send north to Vermilion.

You get all the agricultural implements in there, binders, mowers, horse rakes, steam threshing mills, just the same as you get outside.

At the Lesser Slave lake at about 56 degrees north latitude, there are some white people, pioneers who have been farming for the last four or five years.

They raise oats principally and wheat. Witness had seen beautiful crops of wheat the last two or three years. They use the grain for local consumption. Oats were worth $1.50 a bushel there last year. The Hudson Bay Company and traders and half breeds and Indians that have horses buy the oats. They do an immense traffic in there carrying supplies. It is the outlet into the Peace river.

Last year the settlers at Lesser Slave lake got their crops in about the first of April. As to the harvest, they were done about August 20.

From the Big Smoky across through what is called the Spirit river country, but which is not a very extensive country, there is a very fine looking district. Mr. Conroy saw some very fine crops growing there. Wheat, oats, barley, potatoes and many other vegetables grow. There is quite a little settlement of pioneers who have been there for some years. Going west from there we come to another little prairie called the Puskopee prairie, but there are no settlers yet. That is open country, and is a very fine looking country. From the Spirit river country, all through, you get the buffalo grass all over the country.

The settlers at Spirit river are Canadians or English. There was one man in there for two or three years from Ottawa, a Mr. McLeod. There are white men with their wives and families, not very many, but there are some. They are going in now every year.

As to the Indians in Treaty Eight, there are about four thousand treaty and two thousand non-treaty, about equally divided between Crees and Chippeweyans.

MEANS OF COMMUNICATION.

The Peace river at the Peace river crossing is about 600 or 700 yards wide. The water is very deep in places. There is no rapid. It is swift water. From the mountains there is a clear stretch of navigation down to the Chutes, a distance of nearly 600 miles. As you go north the river gets wider. It is navigable from the Athabaska lake up to the Chutes. The Hudson Bay Company run a steamer up to the Chutes, and another from above the Chutes to the Rocky mountains. The Chutes consist of two falls, one probably nine feet high and the other about fourteen feet, and these occur within probably a mile and one half or more.

There are many opportunities for landing.

EVIDENCE OF RICHARD S. COOK, MAYOR OF THE CITY OF PRINCE ALBERT, SASKATCHEWAN, HEARD BEFORE THE SELECT COMMITTEE, FEBRUARY 25, 1907.

Mr. Cook explained that he had been engaged in farming at Prince Albert for the past fifteen years. He has a large stock and dairy farm, operates it successfully, and has made it pay every year. Prince Albert is a little north of latitude 53, some 48 miles further south than Edmonton.

Witness explained that he had travelled considerably over the country about Prince Albert, particularly to the north and northwest of that city.

He has gone north from Battleford and down the Beaver river. Little is known of that country. It has always been travelled by canoe.

Stanley Mission is the furthest north he had been, 250 miles north of Prince Albert, and about the same distance north of Battleford. The country in that northern district is fit to be an empire in itself and a wealthy one. People know little of it yet, but it is going to prove an excellent country for agriculture. It is such an immense country it is hard to grasp the possibilities of it. You might travel over it for years and know very little about it. There is very little open country there, except where the fire has gone, but about 75 per cent of the soil in that country is good, capable of being cleared up and becoming good agricultural land. The area must be at the least about 250 miles by 250 miles. It is hard to judge.

In travelling about the country, he had examined the country about Fort Pitt, Beaver lake, Moose lake and Cold lake. For a considerable distance immediately back from the River Saskatchewan the soil is light, not a very good country.

AGRICULTURE.

The country immediately behind Fort Pitt is fit for raising grain. This district is quite a piece north of Prince Albert. The further north you go in that country, the better it is. The country is dropping gradually; the altitude is getting less, and on the Chippeweyan reserve, south of Cold lake, there is as fine land as witness had ever seen in his life. The grass is 4½ feet long, and people have been known to grow 100 tons of hay the first season. Witness doubted whether wheat would grow the first year.

Around Cold lake the fires have been very destructive. There has been good timber there, and where it has been burnt over the grass is good. It is stumpy yet. The soil is all right and the pea vine is growing, and good rich grass, so that witness thought the country down the Beaver would be a fairly good agricultural country. This district is 150 miles north of the Saskatchewan. It would be northwest of Battleford about 150 miles.

At Fort Stanley and the Churchill, 250 miles north of Prince Albert, they are raising all kinds of stuff. There is a sheaf of wheat in the Board of Trade in Prince Albert which was brought from there, and it is certainly a very fine specimen. The secret of the whole thing is that the country is falling as you go north and east, and the climate remains about the same. As your altitude drops, there is a great deal of timber, and the temperature remains very much the same. As you go west you are getting higher up, and there is more danger of summer frosts. Witness thought that in the areas he had visited in the north there is a country that will be settled up and sustain a large population.

The fires have been very destructive in parts of the Fort Stanley country. The soil throughout at one time was a good soil, but where the fires were very heavy and

hot it burnt the top of the soil. He would judge that 75 per cent of that country has good agricultural soil as soon as it is cleaned out.

FORESTRY.

Passing down the Beaver river country and towards Prince Albert, there is a large quantity of very good spruce. Witness thought that the soil throughout had been in the main very good but the fires had been very destructive, and burned off a good deal of the top soil. Where that top soil is gone the country is of very little use. It is growing up with black birch and second growth poplar, but where the fires have not destroyed the top soil it is a good country. There are openings, but to no great extent.

Down through the region immediately north of Prince Albert, and on through to Montreal lake, it is pretty much a timber country, and the same remarks will apply to it. The soil is better throughout. There is more good land, and always has been, and the timber is better wherever it is left. The fires have been very destructive there.

The poplar is good wood and will be useful some day. At present it is not used as it is not required, there being plenty of spruce, but it will be used some day.

There is quite a lot of timber all through the country between Prince Albert and Stanley Mission. There is merchantable spruce in large quantities around there. A good deal of it is taken up by timber berths, but there is a good deal of it left. There are small bluffs scattered all through the country. There is an unlimited quantity of pulp wood in there. Where it is not good timber it is pulp wood.

About two-thirds of the timber immediately around Stanley Mission has been destroyed by fire.

There is no calculating the amount of the timber that has been destroyed, and the very best spruce at that. The government are now taking steps to try and put a stop to the burning. They have fire engines out there during the dry season, but it is such a vast country it is a very difficult matter.

FISHERIES.

Mr. Cook is at the present time inspector of fisheries. Once, some years ago on the Beaver river, he had seen 32,000 whitefish caught in two nights, which would average about 2 or 2½ pounds each. They put up the winter supply of fish in three or four nights. These fish were caught by half-breeds and Indians. The fish were coming down after spawning, and those catching them set the nets right across the river. This happened in close season, 'but they did not bother about that; it was the fish they were after.'

There are whitefish, trout, jackfish, and some sturgeon in the Torch and Saskatchewan rivers.

Reindeer lake and the small lakes all around it are full of fish. They fish up there until about December 1. Sometimes the lakes are open until December 15, and break up again about May 15 to 20. It deepnds upon the size of the lake. If it is a very large lake it will take a little longer. Witness had seen the lakes open on December 15. Those lakes are teeming with fish, with whitefish, sturgeon and trout. The trout run as high as 50 pounds.

The sturgeon run from ten to one hundred pounds. Witness had never seen one over 100 pounds. He had seen one whitefish that weighed 17½ pounds, and trout that weighed fifty. He had them for the exhibition in Ottawa, but the train was blocked and did not get through. The biggest jackfish he had ever seen weighed forty-five pounds. They have some little bits of things and they range from that up. In other places they have big fish from ten to forty-five pounds in weight. There is no

doubt it would do the lakes good to take a number of fish out of them. Witness recalled that when they started to fish in Candle lake the fish were poor and thin. After they fished that lake for a couple of years, the fish became good again. You do not do the lakes harm by fishing. It is like the timber in that respect. If you cut out the big timber you protect the smaller timber, and it grows faster.

Hon. Mr. Power asked if it was not possible that a certain amount of food went into the lake after the settlement, and that would be one reason.

Mr. Cook replied that was not the case.

Commercially there had been very little use made of the fish. This year they are shipping again to the United States.

Lac La Ronge is an immense beautiful lake teeming with fish.

MINERALS.

Mr. Cook explained that he could not say much about minerals. There is a coal seam about seven miles east of Prince Albert which runs under the Saskatchewan river. At the Mackenzie coal mine there is a shaft sunk 20 feet probably, and there is fairly good bituminous coal. You can trace the seam across the Saskatchewan. You can find coal up to the size of your fist for a certain distance, and then it ceases. There must be an outcropping under the river. Nobody is bothered about the coal. Coal has also been discovered at Lac La Ronge, there is no doubt about that. Good samples have been brought in, but nobody bothers with it yet because wood is so plentiful.

CLIMATE.

Mr. Cook did not consider the climate of the country north of the Saskatchewan as severe as that at Winnipeg, for the simple reason that the timber tempers it, and the altitude is lower. There was a Chinook at Prince Albert on February 14, 15 and 16 of this year. The snow was pretty much gone.

The average fall of snow is about ten inches. It had been reported that Prince Albert had about 54 inches of snow during this year, but witness was prepared to swear that there was not more than 15 inches. He measured it purposely. The Chinook wind strikes Prince Albert about three times during the winter. They are generally sure of a thaw in January. This year they did not get it until February. It was late. Witness had a letter from his wife in his pocked dated February 16. She wrote that the snow was going very rapidly, and she was afraid the meat in the store house was spoiled. It is not a country of deep snow at all. Last year there was scarcely enough to get sleighing all winter, and the same the winter before. There was no sleighing until about January 1.

Some of the farmers allow their cattle to run out of doors all winter, but it is not a good practice. They have to feed them, of course. Last year witness was harrowing on March 17 and seeding about three days after. He had a good deal of his crop in April 1. With regard to the fall frost, if you do not get the frost by August 25, you do not get it until the end of September. Prince Albert occasionally gets it in August, and the farmers get their crop harvested before that time. The old system of broadcast farming and seeding in the spring has gone out of date. It is a thing of the past.

Fall wheat has never been attempted at Prince Albert. Witness thought it would grow there. He had only had one year that was too dry for farming, that was in 1886. He had never had crops cut down by the frost so that the wheat field would look like the street.

The country is well watered all through. He has a well on his farm only four feet deep, and he waters fifty head of cattle and four horses.

SETTLEMENTS.

Settlements have been started 20 miles north of Prince Albert, and some years ago an American went in there and has a beautiful farm. The witness brought in a collection of vegetables from that country, and he never saw a better lot of farmers' produce in his life. This original American pioneer was growing Turner raspberries, and any one will tell you that where you can grow Turner raspberries, fall wheat will grow, and where fall wheat will grow the climate is fit for anything. The settler in question got the Turner raspberries from witness in Prince Albert. It takes a certain climate to grow that raspberry, and they claim the same climate will grow fall wheat. It is not the wild raspberry of the country; but a variety sent out from the experimental farm in Ottawa. Wild raspberries grow all through that country.

That one man starting out demonstrated that the climate was all right, and others followed suit, and there are now 150 or 200 settlers in that country, which was considered a few years ago as no good.

The same remarks apply to the country clean out to Candle lake. That country is fairly clear and open and there is some hazel brush, and where hazel brush will grow the land is considered good, and where poplar will grow it is also considered good soil.

MEANS OF COMMUNICATION.

Mr. Cook explained that the people out on the Saskatchewan and north of it anticipate beig able to ship by the Hudson bay route. They are all expecting it. They consider that there is not a question of doubt, but that it will be successful. They expect an open route via Hudson bay for half of July, all of August, September, October, November and a part of December. Witness was speaking from the information received from people who spent their lives on Hudson bay. He had met men in the Hudson bay service who had been up in Ungava. Many of the Hudson bay officials come in to the Prince Albert district to settle, after they have been superannuated. From information obtained from these old Hudson bay men, his honest opinion —nothing more—was that it was a perfectly feasible route for the months he had given; half of July, all of August, September, October, November and a part of December.

Mr. Cook, concluding, remarked: 'When you are shipping out your cattle, you are sending them by the short route, and the shrinkage will be light. One feed, or probably none at all, will take you to Churchill, and you will get a third of the crop out at least before the frost, and that will be a great relief to that country.'

EVIDENCE OF THE VENERABLE ARCHDEACON J. McKAY, OF THE CHURCH OF ENGLAND DIOCESE OF SASKATCHEWAN, HEARD BEFORE THE SELECT COMMITTEE ON FEBRUARY 27, 1907.

Archdeacon McKay explained that he had been forty-five years in the west, in charge of missions of the Church of England and was ten years at a place on the Churchill river, a little north of Lac La Ronge. The nearest point to Lac La Ronge on the map is where the Anglican mission is situated, about ten miles north of Lac La Ronge, on the Churchill river. This is almost due north from Prince Alert, and in a straight line it would be considerably over two hundred miles from Prince Albert. Then the witness had been in the Saskatchewan district generally, travelling between Prince Albert and Battleford and down the river as far as Grand Rapids, travelling backwards and forwards most of the time. He had been for some time superintendent of the Anglican missions. For the last two years he had been at Lac La Ronge.

White settlement at present is not yet practically settled. The district north of Lac La Ronge is rocky. The Laurentian formation extends along that part of the country. The south side of Lac La Ronge is of limestone formation, and from there on to Prince Albert it is not a rocky country. The rocky country begins there. Lac La Ronge is not the head waters of the Churchill river. The land between Lac La Ronge and Prince Albert in some places is very good. It is all forest practically until you get about thirty miles from Prince Albert, or perhaps twenty or thirty. You then begin to get into the open country where it is not heavily timbered.

The wild fruits are cranberries, raspberries, blackberries, blueberries, gooseberries, saskatoon and wild currants.

To the west of Lac La Ronge the country is very much the same. It is not rocky, some muskeg and some pretty good land, but all timbered—in some places heavy timber. There is spruce and poplar. The spruce is good enough for lumber, and of course it would do for pulp wood.

Archdeacon McKay explained that he had been as far north in this country as Lake Cariboo. In fact he had been away to the north end of Reindeer lake. It is a pretty poor country up there, and the trees are not very large.

In reply to a question, the witness stated that he was born on the eastern shore of James bay near Rupert's house. His father was a Hudson's bay officer. Witness had his education in Manitoba in the early days. He had been more in the old country than in eastern Canada. He lived at Moose Factory until he was eighteen.

From the Churchill he had been down to Hudson bay, and he had been as far west as Ile a la Crosse lake and on to Lac Loche, which is not many miles south of the Clearwater river and in an east-southeasterly direction from Fort McMurray. His sphere of work, since he commenced, has been in Saskatchewan.

Asked if he thought that there is any territory around Hudson bay and up to Lac La Ronge which would in future support settlement, Archdeacon McKay said he would hardly think so. That is a very rocky country. He had never heard of any minerals in that country.

AGRICULTURE.

So far as agriculture at Lac La Ronge is concerned, witness had raised good wheat on that point on the Churchill river for seven years in succession without having it frosted. The climate is good. It is a rocky country, and there is not a great deal of good land; but so far as the climate is concerned it is all right for raising anything that can be raised in the Saskatchewan generally. Potatoes grow splendidly.

The witness had travelled the country about Lac La Ronge pretty thoroughly, and if it were cleared of timber it would, in his opinion, be generally fair agriculture land. The rocky country is north of that.

He could not describe what the grasses are, but they are grasses that grow mostly in moist land, something like slough hay, grasses that grow on the margins of lakes, and along the rivers. There was not much stock there, but he had stock when he lived on the mission on the Churchill river, fifteen head of cattle and two horses. That is a little north of Lac La Ronge, and is practically the same country.

As to the Lake Ile a la Crosse country, witness considered it fairly good. It is not rocky and there is plenty of timber and plenty of hay as a rule—some prairie hay and some swamp hay, and the soil is fairly good—better than Lac La Ronge. It gets better as you go west. It is certainly better about Ile a la Crosse than at Lac La Ronge, and there is no rock country about Ile a la Crosse. The hay is long. It is very much the same as the natural hay in Manitoba.

While living at Moose Factory, which is at James bay, at the very mouth of the river, he was connected with the mission. They always had a good garden at the mission and there were others. They never raised wheat in his time, but they raised barley and almost every variety of ordinary garden vegetables, potatoes, peas, carrots, beets, beans, &c. He thought these crops could be raised, say fifty or a hundred miles back from the bay.

FORESTRY.

As to the country around Lac La Ronge, there is timber all through it, wherever it has not been destroyed by fires. In some places it has been killed by fires for the time being, particularly in the rocky country. The fires seem to be more destructive in that class of country than in the other part. Archdeacon McKay explained that he put up a saw mill at Lac La Ronge last year, and it is run by water-power. The logs that are sawn there are the kind of timber found in that part of the country. They average seventeen logs to the thousand feet. They would be logs fourteen or fifteen feet long. The diameter would be about two feet across at the butt—good, large logs, clean timber, very much the same timber as at Prince Albert. This good timber is scattered all over the country, sometimes for miles. It depends on the nature of the country.

Asked how far this timber area would outskirt to the east, west and north, witness replied he would say that kind of country extends all the way through right down to Lac la Ronge, and down all the way to the border of the province. Although he had not been through it, he had travelled backwards and forwards on it a good deal, visited Indian camps and so on, and it is very much the same kind of timber all through. In some places it is muskeg, and in some places heavy timber.

Reindeer lake is not north of the tree limit. There are trees there, but they are small. They do not grow so large as further south. It is a good way north of Reindeer lake before you get into the barren grounds. Witness had never been further north than Reindeer lake.

FISHERIES AND FUR-BEARING ANIMALS.

In Lac la Ronge and the lakes generally fish are abundant. They are mostly whitefish and lake trout. The Indians do not sell them; they have no market. There would be abundance of fish for some time for commercial purposes, and witness believed that next year the people of Prince Albert would be in there for fish. There are plenty of fish in Reindeer lake.

As to fur-bearing animals, last winter (1906) was an exceptional winter, and they were unusually scarce. Sometimes they are on the increase, sometimes on the decrease, but taking it on the whole there is a decrease, specially in beaver. The beaver is nearly

killed out—exterminated. He had heard that the killing of beaver is prohibited, but it does not seem to affect business out there at all.

Asked as to the fish of Hudson bay and James bay, Archdeacon McKay replied that fish are not numerous on the coast of James bay. They had whitefish, pike or jackfish and perch. There are no salmon in that part. There are salmon in Hudson bay. He had been north of Big Whale river. He did not know that there were salmon there, but there were salmon in a river near Cape Jones. He had never seen any mackerel, herring or cod. He did not know if there are cod go into Hudson bay. He had never seen nor heard of any, nothing but whale and walruses. He was up in Hudson bay in August travelling in a canoe and saw some loose floating ice there.

CLIMATE.

It is a peculiarity of that part of the country around Lac La Ronge that the frosts are very late. On a small island in the lake Archdeacon McKay has seen potatoes in the beginning of October with the vines untouched by frost at that late season. That was of course on account of the large body of water that equalized the temperature. On the mainland that probably would not be the case, but two years ago he was at La La Ronge when Mr. Chisholm, the Indian inspector, came out to make treaty payments towards the end of August, probably August 20, and the potato vines were not touched at all either on the mainland or on the islands, and the inspector told Archdeacon McKay that they had been a good deal touched in Prince Albert before he left.

The snowfall is not very heavy. It is generally a little heavier than in the Prince Albert section of the country, but not always so. Three feet on the level would be considered deep snow.

As a rule the first frosts come some time in September. Last summer the potatoes were touched with frost about September 15, but not seriously. In the spring one can put in grain from May 5 as a rule. The witness used to sow wheat May 5 generally, and plant potatoes from May 20 on.

The lowest temperature in winter, judging from his own sensations, was about the same as Prince Albert. In the summer time it is quite as hot as at Prince Albert. It is further north and the days are longer.

The weather at Lac La Ronge is moderately dry. Generally there is sufficient rainfall for the crops. Last summer there was quite a long spell of dry weather which affected the wild fruits. It was an exceptional spell of dry weather, but generally there is a good rainfall. The rainy season would be quite equal to Manitoba's. Witness did not know that it was greater. There is rain almost at any time during the summer. There are frequent thunder storms and occasionally hail storms, but not more frequently than they have in the prairie country.

In reply to a question by the Honourable Mr. Ferguson, Archdeacon McKay said he thought the summer heat at Moose Factory and Lac La Ronge would be very much the same. He did not remember anything that would lead him to think there would be much difference. The winter is decidedly more severe on the bay. In the summer the temperature changes more rapidly in the bay than in the interior. He had often known the heat to be great in the forenoon, and in the afternoon perhaps the wind would change and the tide coming in there would be quite a chilly afternoon. There were very sudden changes of weather on the bay. The ice was not in sight all summer at Moose Factory. They lost sight of the ice as soon as the ice went out of the river in May, and there would be no further ice in the bay until the river set fast again the following November.

SETTLEMENTS.

The only whites in the country he had described north of the Saskatchewan were the Hudson bay officials and traders. There is no agricultural settlement at Lac La

Ronge. There are only Indians there, and they have not gone into anything in the direction of agriculture more than raising a few potaoes. The witness built the saw mill last year and they sawed lumber for their own mission buildings. Archdeacon McKay is putting up a boarding school there, and intends to saw lumber for the houses. The number of Indians that take treaty at that point is over 500. They are Cree Indians.

MEANS OF COMMUNICATION.

The only means of communication is in the summer by canoe.

Whenever the witness had gone to England he had gone down through the eastern country. His first trip to England was in 1876, and he went by way of the United States. There was no communication between Red river and Manitoba and eastern Canada. He crossed over to St. Paul and went that way.

Being asked why, as the Hudson bay ships made pretty good passages to Churchill, he did not come in one of them, the witness replied it took too long.

He explained that there were ships coming down to Moose Factory when he was there regularly every year. They got in as a rule towards the end of August and the beginning of September. In his recollection they were never later than the middle of September in arriving. They did not remain very long, the sailing vessels leaving about September 20 generally. There was a long period when the Hudson Bay Company never lost a ship—many years in succession they never lost a ship. They always had a ship coming regularly to Moose Factory, one or more, and sometimes as many as three to York Factory.

The witness thought that a railway ought to be built up to Lac La Ronge. There would be no difficulties in constructing a railway. It is all level country. There would not be the slightest difficulty.

EVIDENCE OF JOSEPH BURR TYRRELL, B.A., MINING ENGINEER, OF THE CITY OF TORONTO, HEARD BEFORE THE SELECT COMMITTEE, MARCH 2, 1907.

Mr. Tyrell began his evidence by indicating upon the map the country he had been over in the districts covered by the investigation. He remarked that five or six years' experience in the country south of the Saskatchewan prepared him for the work immediately north of it.

From Edmonton the course of one of his trips in the northern country, was down the Athabaska river to Lake Athabaska, across through Lake Athabaska to its eastern end, up Black river and across the height of land to the Dubawnt river and down Chesterfield Inlet to Hudson bay, down the shore of Hudson bay and across from Churchill on Hudson bay, on snowshoes, to the north end of Lake Winnipeg. Still another year his route lay almost directly along the proposed line of the Canadian Northern Railway. Another year the witness followed the old Hudson bay route down by York Factory and by Oxford House, and in that direction.

At another time the witness took a course from Prince Albert northward through by Green lake and down the Beaver river to the Churchill river, and north across the country by Cree lake to Black river, across on that line, then round through Wollaston lake and up to Geibie and Foster rivers and back by the same route that he went out. Another year he went up from the Saskatchewan across by the Frog portage and up through Reindeer lake and northward from it through a chain of lakes to the headwaters of the Kaszan river, down the Kaszan river to Yathkyed lake, and then eastward from there cross country to the west coast of Hudson bay. Again he spent a season in the country north of Winnipeg lake, around the Burntwood river and a number of streams there, Grass river and so on, west of the Nelson river. These trips had been chiefly east of the Mackenzie and Athabaska rivers, and west and southwest of Hudson bay. That is the country that his aspirations chiefly covered for some years. He spent nine or ten years in that country. He had not been in the geological service since 1898. He started west exploring in 1883, and was exploring for the Canadian government from 1883 to 1898. It is 24 years ago since he first went west to the Rocky mountains.

AGRICULTURAL LANDS.

To the west of Hudson bay and north of the line of the forest which runs from Churchill northwestward through Ennaidai lake, and a short distance south to Dubawnt lake, and which lake is marked on the map which the witness prepared some years ago for the Geological Survey and published then, there is practically no agricultural land. Mr. Tyrrell would not consider that any of the land north of the limit of forest growth was of any value for agriculture.

The tree line starts practically at Churchill and runs northwesterly. South of that there are trees, and north there are none.

The country north of the tree line is partly rock, but the greater part broken rock and boulders, and a rough stony country without any great elevation, and very little vegetation of any kind, except a great many Arctic plants and sedges. Mr. Tyrrell believes the country is permanently frozen as far as he could see. It does not appear to him that there would be any possibility whatever of growing anything on it. That eliminates from an agricultural standpoint that portion northwest of that line.

Now south of that line there is a belt from one to two hundred miles in width of country that is sparsely wooded. It is not a forest country, but it is wooded along the

streams, and in the more protected places, but there is comparatively little wood of any value upon it.

In that country there are, the witness considers, some of the lower lying areas along the stream and in odd places that would support a northern vegetation, but it is not eminently suited for agriculture. The ordinary plants that are grown in many northern countries could doubtless be cultivated in many places. There is very little humus, very little decomposed soil there, except just in the valleys.

South of that again is a belt of forest. That country is essentially suited for agricultural purposes. It starts on the east between Lake Winnipeg and Split lake, and extends westward along the Churchill river to the Athabaska river, which is as far as witness knows. The eastern side of the tract in question would be the Nelson river. He was not east of the river—with the exception of about 20 or 30 miles. He does not know the country. That belt of forest is for the most part excellent agricultural land. As far as the observations of witness goes, he believed that that country, while a little harder to settle up, and not so productive to settlers who are going in and looking for farms ready made and cleared for them and ready to put the wheat in, that forest belt will be as fine an agricultural tract of land as there is in the northwest.

Everywhere in travelling through it, the evidence of rich vegetation was abundant, and everywhere where gardens or any kind of agriculture or horticulture had been attempted in this forest belt it had been eminently successful.

It is a forest country, a spruce covered country, and is southwest of Hudson bay and the Nelson river, north of the Saskatchewan river and extends to the Mackenzie and Athabaska rivers. It would be about 200 miles wide from north to south. Witness did not remember the length of it. It is similar land to Ontario, and will grow practically everything that will grow in Ontario, except possibly down in the southern peninsula of Ontario.

The summer is warm. The winter does not count, because things do not grow in winter. There is a good rainfall. A small part of the district is park country, half wooded. It is a continuation northward of the Saskatchewan country.

Mr. Tyrrell said he had seen growing in that country all the garden products that they grow in Ontario—potatoes, carrots, turnips, cabbage, cauliflowers and all the ordinary garden produce. He saw excellent potatoes in the district around Nelson House. He could not say what time they were planted, because he was not there.

INDIAN AGRICULTURE.

The Indians, constantly in hunting, plant little patches of potatoes here and there in the spring and leave them all summer and go back in the fall and dig them up when they go back to their hunting grounds, and use them for their winter supply. The witness had gone out and dug a pail of beautiful potatoes on several occasions out of these little Indian patches buried in the woods. They had never been hoed or cultivated in any way. They are not looked after from the time they are planted in the spring until they are dug in the fall. The potatoes seem to be able to grow sufficiently to keep down the weeds. As a protection against wild animals these potato patches are usually planted on islands. Witness had not actually seen wheat, barley and oats grown in that country. He has fairly good evidence that they are grown there, but as far as he remembered he had not seen any himself. He had been told and believed that they grow there.

There is no doubt whatever that the country described will support quite a thick population.

North of Lake Winnipeg there is another magnificent area of from five to ten thousand square miles of as fine country as there is in Manitoba or anywhere else.

That is on the proposed line of the Hudson bay railway. When the witness came out of there a number of years ago, after spending a summer there, and said there was a rich agricultural country north of Lake Winnipeg, the Hudson bay men and

the people in the southern country pooh-poohed the idea. They said they had been up at the head of the lake and knew there was not a foot of good land there. But there is a magnificent stretch of country there, and it extends westward along the Churchill. These lands north of Lake Winnipeg are clay lands, an extension of the same basin as the Manitoba clays.

As to the country immediately north of Lake Athabaska it could not be considered as being within the arable area. The arable belt, however, as you go west to the Athabaska river, widens enormously. As to that, of course, witness could not speak from his own personal knowledge of the country. He spoke generally of the vast country west of the Athabaska river until you get to the Peace river country, and there is certainly a large tract of agricultural land there. However, one or another may differ about the value of any particular part of that country. In the country as you go west into the Peace river region, there is certainly a large area of good land that the witness would not attempt to confine inside of such a belt as he had been speaking of.

FORESTRY.

In speaking of the forests of the country north of the Saskatchewan, the witness explained he would have to divide the country in very much the same belts as for agriculture, because agriculture and forests were very closely connected. Agriculture has to be very much governed by the forest growth. Far in the north there is a tract of country he had already outlined that has no trees on it: then a belt of country from one to two hundred miles in width with small banksian pine, spruce, larch, poplar and some white birch. He would not consider any of those woods valuable for timber purposes, except locally. They would serve for pulp wood, but the growth is not thick. Still in a considerable area, there might, of course, be a large quantity of timber for pulp wood. In that belt the trees would average probaby six inches. Occasionally you would find some a good deal larger. The poplar grows on the drier lands. It is not an indication of good land in an extremely northern country. It indicates a dry sandy soil, but further south it indicates excellent soil. The country to the south of that, the thickly wooded belt, contains a large quantity of timber, chiefly white spruce, trees up to eighteen inches in diameter. It is a wooded country with trees from twelve to eighteen inches in diameter, tall with clean trunks—good, nice timber. Of course the timber does not grow as large on high dry sandy ridges, as it grows in the valleys. Most of the timber is in that good soil in the valley bottoms, but there is more or less wood land all over. The hard wood, poplar and birch affects the higher land, and the spruce and hemlock the valleys.

FISHERIES AND GAME.

As to the fish supply of the country north the Saskatchewan, the lakes everywhere are well stocked with trout, and the shallower lakes with whitefish. Whether the deeper lakes have many whitefish in them or not, witness could not say. At times he could catch whitefish in them and at times he could not, but he had no doubt that all these lakes are well stocked with whitefish. He always could get abundance of fish in them. Some of the small shallower lakes contain whitefish in enormous numbers. He had seen the fins of thousands sticking up over the water, while paddling along in a canoe. As far north as Dubawnt lake (63 north latitude), the whitefish and trout were plentiful in all the streams. Mr. Tyrrell caught them in Dubawnt lake. Further northwards he did not catch any and does not know what fish there are along the shores there. The Esquimaux report that there are salmon and other fish there, but witness did not see them himself.

There are great quantities of fish. The fact is there are all the fish the lakes will hold—they are as full as the water can supply food for them.

Asked as to the size of the Dubawnt lake, witness explained that he travelled around one side of it for about 150 miles, but the other shores were not visible from that side. Nobody knows the full size of that lake. The south and east shores, as shown on the map, are just an imaginary sketch. Standing on the hills on the west shore the witness could not see the east shore, though the hills on which he stood were several hundred feet high. It is a large body of water. The map merely shows the lakes that are known. There are thousands of others that we know nothing of, because nobody has been through there. Some of the larger ones are sketched in. The witness sketched in many, from the reports of the Esquimaux, and they still appear as he so sketched them on the map. The whole country is studded with lakes.

The Esquimaux live entirely on fish and game. They have not very good means of catching fish. The Esquimaux usually catch the fish with short lines made of sinew, which are very poor and elastic. They cannot keep them long in the water at a time. Then a piece of twisted iron serves for a hoop.

These natives often suffer from hunger, because while the deer are very, very plentiful at times, still they are gregarious, gathering together in herds and those herds do not always follow the same course. There may not be a sign of deer near where the Esquimaux live, and they have no means of knowing though there may be a herd within 15 or 20 miles of them.

Mr. Tyrrell came across a good many cariboo in the north, and he had taken photographs of great herds of cariboo. He did not get as far north as the musk-ox country.

MINERALS.

Mr. Tyrrell explained that the primary object in all his explorations through that country was the mineral development of the country, and any other information that he collected was incidental.

From a line at Cumberland House on the Saskatchewan river northwestward to the Churchill river, and westward from the Churchill river, the country to the south of that line is underlaid by the more recent clay rocks of the plains, and the mineral wealth that is to be looked for there is coal and iron. He has considerable confidence in both those most useful products being found in that country.

Coal is found on the Saskatchewan river at Edmonton, and on the Pembina river, west of Edmonton, and there are several more outcroppings of coal down the Saskatchewan river as far as Prince Albert. He had been told coal has been found out near Lac La Ronge, but most of the country north of the Saskatchewan river has not been explored for coal. It is a country of gentle slopes covered with grass and wood, and the coal outcropping in such a country is certain to be covered. There is no possibility of seeing it as a natural outcrop. It has to be looked for, but it has not been looked for in that country to find it, so he is perfectly confident that the same seams that outcrop on the Saskatchewan, in the west at all events, will be traced much further north.

North of the coal land there is a district from Cumberland House northeastward towards the Nelson river which is underlain by what are known as Keewatin and Huronian rocks, the same rocks that they are finding in northern Ontario at the present time. The very existence of those rocks is barely known. There has been practically no exploration of them, no prospecting, so that no one can say as to whether they are to be a barren portion of those rocks which are rich elsewhere, or whether they are to be like the Huronian and Keewatin rocks elsewhere, rich in minerals of some of the kinds desired.

Comparing them with the rocks in other places, they have large possibilities.

From that point there is an area of sandstone in the vicinity of Cree lake which may contain copper, but we know of nothing of it yet. It is something of the age of the rocks that are rich in copper around Lake Superior, but it has no mineral wealth shown as yet.

North of Lake Athabaska, for a certain distance, there are Huronian and Keewatin rocks again which certainly contain iron and small quantities of gold and silver, but larger quantities have not yet been outlined. Ore being a mass of mineral that can be worked at a profit, no ore has yet been found there, but there are precious minerals. The country north of Lake Athabaska is one of the most likely looking mineral countries that Mr. Tyrrell had ever been in. There are outcrops of tar sands along the Athabaska river near Fort McMurray. There is an enormous amount of sandstone there impregnated with hard thick petroleum or tar. The probability is that when one gets back from the outcrop in some places that will be found as a liquid oil instead of a hard tar that is found there on the Athabaska. Mr. Tyrrell said he thinks it is quite a fair and reasonable supposition that one would find good fluid oil in the beds of the same geological age as the tar sand of the Athabaska river. This tar sand is very strongly in evidence along the river, and an enormous amount of tar has actually gone to waste, as it were—flowed out and hardened there.

The tar sand area extends along for quite a number of miles along the river. As you descend the river you get to those tar-bearing beds, and then they are in evidence along for a number of miles down the river. Then you leave them altogether, and they do not occur again. Mr. Tyrrell considered it highly probable that the petroleum or liquid would be found in close proximity.

Of course the sandstone or tar would not have a marketable value at the present rates of transportation. But outside of that, probably it would be used as paving material if it is needed in that vicinity. He thought it could be used for making pavement.

After leaving the Huronian rocks north of Lake Athabaska, one then strikes through a grand country for seven hundred miles on the routes that the witness travelled which does not show much evidence of minerals.

Then as you get from the Dubawnt lake you get on copper-bearing rocks similar to the copper-bearing rocks of Lake Superior, and those are undoubtedly the same copper-bearing rocks which extend across the Coppermine river, and which have there been known to produce native copper—at least the workmen bring in the copper from the Copper mine river to make implements.

Mr. Tyrrell said he would not expect to find silver in connection with the copper. They do not find silver in any quantity with the copper of Lake Superior. They do find silver in place, but not on the Calumet peninsula. The silver appears in a slightly different formation. While it occurs in rocks of somewhat similar age, still it is not immediately associated with the copper, and the rocks that one finds from Dubawnt lake northward, covering quite a large area, are very similar to the copper-bearing rocks on Lake Superior.

Taking a set of specimens from the copper-bearing rocks of Lake Superior, the witness declared he could duplicate them almost exactly from a set of specimens from these northern rocks in all the peculiar minerals—and there are a great many of them. He saw a small amount of copper in many places in these rocks, and we know that it occurs in the rock, because the Esquimaux pick up native copper and make their implements from it. So that he looks for a large development at some time of a copper industry in that country between Chesterfield Inlet and the Coppermine river. He has never been at the Coppermine river himself.

Really the principal exploration of the Coppermine river was done nearly 100 years ago, and there has been very little exploration of it since. It was visited by Dr. J. M. Bell some three or four years ago, but he just barely touched it, and Sir John Richardson in the early part of last century really gave us all the information that we know about the Coppermine river. It is a district that should certainly be investigated within a reasonably short time again.

In that northern region there is a large area of mineral-bearing country. As you come out to the mouth of the Chesterfield Inlet there is an area of Keewatin and Huronian rocks, such as witness had mentioned—the conglomerates of northern

Ontario, which have been found to be so rich here, and they are known to contain a certain amount of gold and copper. Mr. Tyrrell saw them himself there, and he has every confidence that that area too will produce minerals of value, workable ores. There was no indication of nickel in any part of the country.

CLIMATE.

As to the climate of the great belt of arable land, two hundred miles wide that he had described, Mr. Tyrrell said that at Nelson the snow leaves the ground in May. There is little or no summer frost in that wooded country. He understood gardening commences the end of May, and the frost does not appear in the fall until about September 20. He had never known the potato crop to be lost through summer frost.

Asked as to the isothermal line, Mr. Tyrrell remarked that the isothermal is a line connecting points that have the same annual mean temperature for the year round. It has nothing whatever to do with vegetation. Things do not grow in the winter time. People have got to put the winter temperature absolutely out of the question. The summer temperature is the only temperature that counts for growth in the northern country where there is frost. In dealing with that, you have to take into consideration as between two places in different latitudes, the length of the day and the amount of sunlight, in order to get at the summer temperatures. Of course the sunlight has a great effect on the growth, and where the days have 18 hours' sun a plant will grow faster than where the day has only 14 hours.

The effect of the large body of water in Hudson bay and James bay on the temperature, summer and winter, of the surrounding country, was the equalizing of it very much, making the summers colder and the winters milder. There is a foggy climate around the bay. It is without much sunlight, so that it has not a chance to dry. The mean temperature of the summer within 100 miles of the bay will not be as hot as it is back of that. The thermometer does not fall as low in winter at Churchill. At the same time any person will find it terribly cold on that coast, although the thermometer does not fall. There are a great many different matters in connection with temperature and climate that have to be taken into consideration. There is the amount of moisture in the air whether it is heavy, whether the barometer is standing low or high, and there are a great many of those things that have to be taken into consideration in any question that arises of frost or of climate. You may have frost with a north wind, while if that north wind were blowing up over a wooded country, where all the leaves were giving out their vapour from the ground into the air, you would not have a particle of frost.

Mr. Tyrrell produced the following memorandum he had obtained from the superintendent of the Dominion Meteorological Service:—

MEMORANDUM.

Meteorological Office,
Toronto, March 9, 1907.

To J. B. Tyrrell, Esq.,
Toronto.

The temperature conditions of the district between Lake Winnipeg and Split lake in the several months, May-September, may be compared with Europe as follows:—

May—50°-40°, with north of Scotland and southern Norway.
June—56°-54°, with Scotland.
July—63°, with south of England.
August—57·5° to 55° with Scotland.
September—50°-45°, with northern Norway and Sweden.

(Sgd.) R. F. STUPART.

SETTLEMENTS.

There is practically no settlement through the far north country—the only inhabitants being a few Esquimaux and Indians.

There are not many Esquimaux in the country. They are not a prolific race at all. Witness supposed the total number of Esquimaux he saw all through would be about 500. Of course the Indians do not go north to the barren lands, except that they hunt a little way in them.

The Esquimaux are happy when they have plenty to eat and the weather is fine. He had never seen a happier people under those circumstances. With the appliances they have for catching fish it is hard to get them. In the summer time they live in skin tents, the skin having the hair on; in the winter time they live in snow houses.

The Esquimaux apparently have very little communication with white people, because they have very few white men's implements. For the most part their hooks were made of nails, and other things they probably have picked up from other Esquimax who were trading to Hudson bay. They use the bow and arrow a good deal and hunt the cariboo almost entirely with the spear.

MEANS OF COMMUNICATION.

The only means of communication in the north is by canoes, but at the same time Mr. Tyrrell remarked that he would not have any hesitation in taking a train of pack horses, and coming with a pack train between the water stretches across that country.

NOTE.—Evidence given by Mr. Tyrrell as to the practicability of the Hudson bay route, will be found in Section C.

EVIDENCE OF W. F. BREDIN, MEMBER OF THE LOCAL LEGISLATURE OF ALBERTA FOR THE DIVISION OF ATHABASKA, AND RESIDING AT LESSER SLAVE LAKE, HEARD BEFORE THE SELECT COMMITTEE, APRIL 3, 1907.

Mr. Bredin explained that he has been residing ten years north of Edmonton. He lived in Edmonton some time ago, and has lived all over the northwest pretty well. He was born in the county of Stormont, within 40 miles of the city of Ottawa, in the province of Ontario. He has been from Edmonton north to Fort Wrigley, and he has been on the Peace river from Fort St. John, 30 miles inside the British Columbia line to about 500 miles down the Peace—from that point. Ten years ago he went down the Athabaska to the Mackenzie in boats. The valley of the Athabaska from where the McLeod river empties into it to the Grand Rapids, a distance of about 300 miles, is largely timbered with small timber. There is practically no prairie along that part of the river. The timber is poplar and spruce. It is not scrub exactly, but there is not much saw timber. He knows very little about the country back from the river, but he has been told by the half-breeds and traders down in that country that that part of the country back from Athabaska is very much like it is along the river. The soil is fairly good, and in some places very good. Down to Fort McMurray, where the Clearwater river goes into the Athabaska, the character of the country is very much the same. Below that point the elevation of the plateau above the river is very much less than it is on the Upper river.

It looks like a great alluvial plain, from the river all along from Fort McMurray to Lake Athabaska, 200 miles. That country is more or less timbered, and the soil is excellent.

Going down the Slave river to Great Slave lake, for a distance of 300 miles, on the east of the Slave river, is the Laurentian formation. It is all rocks; while west of the river the country is all alluvial, and the soil is generally very good, right down to Great Slave lake. The soil along the south shore of Great Slave lake is not of the very best, except where the rivers come in.

The country from Fort McMurray to Lake Athabaska does not seem to have been as much swept with fires as the country south of that. The timber might have been fairly good at one time, but now it is fairly scattered, and a great deal of it is grown up with second growth. The southern end of the 300 miles witness spoke of is in the vicinity of where the McLeod river enters the Athabaska river. Then you go 300 miles from that down to Fort McMurray and the timber is poor, while from Fort McMurray to Lake Athabaska it is comparatively good timber and better land. While it is better land there is not really very much difference in the timber.

There is not much fertile land at Wrigley. Down there the Rocky mountains are on both sides of the river, and there is a great deal of muskeg. The muskeg in the Peace river country and between the Athabaska and the Peace can all be drained and cultivated some day, however. These muskegs are from a foot to three feet deep until you strike hard-pan. The moss keeps the heat of the sun out. In fact there is ice in some of those muskegs all the year round, covered with moss.

AGRICULTURE.

The southern shore of Great Slave lake seems to have good agriculture prospects. One notable place there is Hay river. There they raise barley and all the common

vegetables. At Fort Providence about fifty miles down the Mackenzie from the lake, they raise barley and all the vegetables every year, and some years wheat and oats.

One hundred and seventy miles below, north of Fort Providence, is Fort Simpson, where the Liard river comes in. Fort Simpson is on an island, the confluence of the two rivers, and the Hudson Bay Company for probably two years have raised barley and vegetables at that point. In some years they might raise wheat, but not every year.

One hundred and forty miles nort of Fort Simpson is Fort Wrigley. That is where Mr. Bredin wintered one winter, and in the spring they put in a garden there. The Hudson Bay Company officials plant gardens every year at that point. The spring that Mr. Bredin was there they got their seed potatoes from Fort Good Hope, which is fourteen miles south of the Arctic circle. They went there because they had no seed, having used up their seed during the winter. Mr. Bredin saw those potatoes. They were a played out seed, a white blue variety. They were not the improved potatoes that we have in this part of the country, but they were a fair size. They had the same class of potatoes at Hay river, but since that they got in new seed, the Early Rover seed, from outside, and they grow very much better crops with this new seed than they did with the old. The season there is quite long enough, because the sun shines there during all the growing season. That is the great secret of the growth in that country.

On the Mackenzie river the trees leaf out almost in a few hours. The quickness with which the leaves appear on the trees in the spring is simply marvellous.

The witness was never up the Liard valley, but heard a great deal about it at Fort Simpson, and he had seen the journals of the Hudson Bay Company that were kept at Fort Liard, 200 miles up the Liard river. From these sources he gathered that they raised all the cereals there, such as wheat, oats and barley, as well as all the vegetables of the commoner varieties.

At Fort Simpson Mr. Bredin saw cauliflowers, cabbage and cucumbers growing under exactly the same conditions as they would grow them in northern Alberta. The cucumbers were simply planted in a hot bed, and allowed to remain there protected in the early spring from the frost and then allowed to grow in the hotbeds, with the sashes off, in the summer time.

The trees throw out their leaves in the Mackenzie basin about the middle of May, before the ice goes out of the river. The year witness was there the ice went out of the Mackenzie at Fort Wrigley on May 23, and the trees were all out in leaf before that time.

At Fort Chipewyan the Roman Catholic priests have a farm which was originally a muskeg, right amongst the Laurentian rocks, and they grow wheat there that was awarded a medal at the Centennial exposition.

Of course at all those Hudson bay posts they always raise vegetables. They do not pretend to raise any other grain but barley, because they use barley for soups. They pound the hull of it in a hollow piece of wood and use the grain for soups.

At the mouth of the Great Slave river and at the mouths of all the rivers running in there, large quantities of hay grows. In fact there is a very rank growth of grass along all those streams as far north as you like to go. Where it is not covered with trees, grass grows. The garden at Fort Wrigley was originally muskeg and covered with moss. As soon as the timber is cut off a muskeg the moss dies, the frost comes out of the ground, and gardens can be cultivated.

As regards the country around Lesser Slave lake, the south shore of the lake is excellent soil, as good as any in the country. There is excellent soil along the Slave river, and on the west side of Slave lake and along the Big Smoky and the Little Smoky it is all a good country.

Across the Big Smoky is what is called the Grand Prairie country, a prairie about 75 miles long and 20 miles in width; and also in there is the Spirit river and the Opaskapee river country. There are settlers in all those three places engaged in stockraising and growing grain and vegetables.

THE PEACE RIVER VALLEY.

As regards the Peace river valley, Mr. Bredin would judge that from the mountains to Peace point, a distance of between seven and eight hundred miles, following the windings of the river, there is an average of 75 miles in width on each side of the Peace river that is equal to the soil on any similar length of the Saskatchewan. That would make the Peace river country about 150 miles in width, and extending from the mountains to Peace point, a distance of seven or eight hundred miles, which is all equally good for agricultural purposes with the Saskatchewan valley. That would extend considerably beyond the bottom lands of the river, including also the table land back of the river. A great deal of it is clean prairie, on the north side especially. There is more of it covered with scrub and small timber than there is clean prairie, but the soil is equally good where the timber grows.

The attention of Mr. Bredin having been drawn by the chairman to the discussion which took place on the evidence given before the Committee on Agriculture in the House of Commons by Mr. Macoun with reference to that Spirit river country and the Opaskapee, and particularly to Mr. Macoun's statement that down in the valley of the river you could produce grain, but that the table land was of very little use, he stated that he had a ranch at Grand Prairie for six years and raised oats and vegetables every year there. He had cattle there for five winters, and the average length of feeding them during those five years was six weeks of each winter. That is south of the Peace river, but within this belt of 150 miles. In that Spirit river country he knows there are some white settlers, as well as half-breeds, who are making their living raising stock and farming.

That 700 or 800 miles of good country, of which the witness spoke, would extend right to the foot of the Rockies. As to the question of the uniformity of the quality of the soil, he had only been down to what they call Wolverine point, near Fort Vermilion. He should say the country is uniformly good from the Rocky mountains to that point. At Wolverine Point the valley is much lower and perhaps the soil may be blacker, and the black soil may be deeper on the lower stretches of the Peace.

All of that country would be good for stock. Both slough and upland hay is abundant. The pea vine and all the small fruits that grow anywhere else in the northwest grow up there, and all the wild flowers that witness knows of in the northwest grow there.

This area in the Peace river country will compare on the whole with any part of Canada.

Mr. Bredin referred briefly to a trip east from the Athabaska district last summer, when he travelled from Fort McMurray up the Clearwater river and thence across to Prince Albert. The land on the Clearwater river for 100 miles in the bottoms is very good. It appeared to witness, however, to be very sandy back on the high rocks. He should think there would be a good deal of rock and muskeg. From where he left the Clearwater river in to Prince Albert, on the north Saskatchewan, the country was more or less of a sandy nature. There were beautiful lakes all the way, filled with good whitefish and trout. The whole northern country is that way.

In reply to a question, Mr. Bredin stated that after his ten years' experience of the country north of Edmonton he would consider that as quite as good a place for a man to settle in as the Saskatchewan valley was 25 years ago. It is in exactly the same position as the Saskatchewan valley was in 25 years ago. During the debate on the capital question in the Alberta legislative assembly at Edmonton, the witness made an estimate of the good land north of Edmonton in Alberta, and it figured up more than the good land south of that city. If you were to add all the good land north of the Alberta boundary to northern Alberta, you would have about twice as much good land in the province of Edmonton as there is south of Edmonton.

ONE HUNDRED MILLION ACRES.

At this point the Honourable Mr. Ferguson asked Mr. Bredin to prepare a careful estimate of all the good land north of Edmonton, east of the Rocky mountains.

The witness said he would have to be guided a good deal by report, but promised to prepare such an estimate. In due course the Chairman of the Select Committee received the following communication from Mr. Bredin:

OTTAWA, April 7, 1907.

Hon. T. O. DAVIS,
Chairman of the Select Committee of the Senate.

DEAR SIR,—Agreeable to your request, I have the honour to inform you that my estimate of the area of the agricultural lands that will be available in northern Alberta —say north of the 55th parallel of latitude—and in the unorganized district of Mackenzie, is not less than 100,000,000 (one hundred millions) of acres.

I herewith inclose you a sample of salt from Salt river, near Fort Smith, in northern Alberta. This sample is very much discoloured, as I have had it in my possession in a canvas bag, for over nine years.

I have the honour to be, sir,
Yours obediently,
W. F. BREDIN,

Proceeding with his evidence, Mr. Bredin said he knew that at Lesser Slave lake they have had magnificent crops. There are three little rivers running in there, and four or five township of practically delta land, and witness had never seen finer crops in any part of the northwest than he had seen there.

FISHERIES AND GAME.

The fisheries of that country are very, very great. The whitefish come from Lake Athabaska as far as Fort McMurray on the Athabaska river, and Lake Athabaska is full of whitefish and lake trout, besides the coarser fish, such as pike, suckers and pickerel. Great Slave river is also full of fish.

North of Fort Smith and further down to Great Slave lake and down the Mackenzie they have a fish that is peculiar to that part of the world. It is called the Inconnu, because it is not found anywhere else. It is a large white-fleshed, silver-scaled salmon in appearance, and these fish run from 15 to 40 pounds in weight. It would be considered a very good fish if there were not better fish in that country.

Fish are very plentiful there and a man can take his own choice. The better fish there are whitefish, lake trout, Arctic trout and herring. The herring come up the Mackenzie to about Fort Wrigley. They are good fish. The witness had eaten fish all the way down through there. They are the main food support of the people of that country both in summer and winter. The herring come in from the Arctic ocean. Witness had been told that Great Bear lake just teems with that same herring. Of course along the mountains they have speckled trout—rainbow trout they call them.

There is no commercial importance attaching to the fish up there, and there is no export yet, except from Lesser Slave lake. Three years ago an outfit from the United States entered there, and they must have taken out about 300 sleigh loads of fish from that lake. They teamed them to Edmonton and shipped them from there. It was 250 miles to Edmonton. They got a cheap rate of freight, because the goods going into Lesser Slave lake and Peace river furnished freight one way, and the fish furnished freight the other. They had freight both ways, and so they had a fair rate on the fish.

The buffalo are found between Peace Point on Peace river, and Buffalo river and Salt river. The number is estimated at from two hundred and fifty up to five hundred. The wolves are so plentiful that they destroy the calves, and the number is not increas-

ing. The wolves might be destroyed if a large enough bounty were offered to tempt professional wolvers. They would soon clean them out, and witness thought it would be worth doing that.

MINERALS.

Mr. Bredin mentioned having seen the gas well on the Athabaska river, about 120 miles from Athabaska Landing, last summer. The gas was blowing off, but it was not ignited. His party lit it up and it blazed up about some 25 or 30 feet. About 50 or 60 miles below that the gas is all the time escaping from the clay banks of the river and in the river itself, because all across the river you can see the bubbles rising. The witness had lit that gas, too, and boiled his tea pail there by hanging it over the flame.

At Fort McMurray an outfit has been boring for oil two seasons. When the witness was there in August last they were down 1,200 feet without striking anything of commercial value, but afterwards they went through over 250 feet of salt in boring there. All along the Athabaska, for a distance of 50 miles above McMurray, and probably 100 miles below it, there are indications of oil, and the tar is just dropping out of the banks all the time. For about 100 miles along the river the bank is practically asphalt. To a layman it looks just like asphalt, tar and sand mixed together.

Then again on Great Slave river down towards Chipewyan there is tar dropping out of the rocks on the banks of the river.

Immediately back of Fort Smith, some 20 miles, the supply of salt for the whole north country is got, and has been got for a great many years, ever since the traders went into the northwest.

Down on the south shore of Great Slave lake, the sandstone is saturated with tar or oil, and in the bay at the north side of the west end of the lake there is a spring of tar.

As far as the witness went down the Mackenzie, there are no more indications of oil or salt, but below the point he went to, at Fort Norman and Good Hope, oil or tar is found again, besides salt and coal.

On his way from McMurray to Prince Albert, the witness found that the tar sands appear on Buffalo lake, which is on the Churchill system of water, and that, in his opinion, shows that the tar sands are both on the Mackenzie water system and on the Churchill system, on both sides of the divide there.

There is coal on the Athabaska, 20 miles north of Fort McMurray, near Fort McKay. On the Peace river there is said to be gypsum, below Boiling Rapid. There is coal near Peace river crossing, and also on the Peace in the mountains, not very farm from Hudson's Hope. At Fort St. John there is a crust of some kind of iron ore which they use as paint. The Hudson bay buildings at Fort St. John are painted from this mineral paint found there. Between Lesser Slave lake and the mountains the country is more or less underlaid with coal.

Being asked if in all that country he had been describing, coal is not more or less apparent, Mr. Bredin remarked, you may travel hundreds of miles there without hearing of coal. Between Fort McKay, which is 20 miles north of Fort McMurray, and away down to Norman and Good Hope, he never heard of coal.

CLIMATE.

Mr. Bredin claimed that the climate generally all over that country is no worse than the climate of Saskatchewan and Manitoba. The worst of it is no worse than the climate of those provinces. He had spent a number of winters at Lesser Slave lake and could see no difference between the climate there and at Edmonton. Lesser Slave lake is 250 miles north and 250 miles west of Edmonton. On the Peace he left Fort St. John one spring, and the grain was up there six or seven inches. He must have been at least a month going to Edmonton, and when he got there the grain was just in the same stage of growth as the grain had been when he left Fort St. John, so it is earlier there. They very often seed at Fort St. John in March, and invariably no later than

April. Last year they began cutting the wheat at Peace river crossing on the last day in July, and the wheat was ready to cut five or six days earlier than that. As a matter of fact, Mr. Brick, the member for Peace river, in the Alberta legislature, started to cut on the last day of July, and he told Mr. Bredin that the grain was ready to cut a week earlier. Mr. Brick cultivates 300 acres of land there in wheat, oats and barley.

Stockmen west of Peace river crossing would have to feed their cattle, taking one year with another, an average of seven weeks, and east of that probably more. The snowfall is greater on the lower part than on the upper part.

West of Fort Wrigley you get right into the Rocky mountains. The spring Mr. Bredin was at Fort Wrigley, the months of March and April were the finest he ever saw. He was there just one spring and it was as pleasant weather as he ever saw in this part of Canada for those two months, while the winters were no worse than he had seen them in Manitoba. The Mackenzie river closed on Novemer 19 that year, and there was a little snow then—and it lasted until March. Practically all the snow went off the latter part of March.

SETTLEMENTS.

The settlements north of Edmonton are at Lesser Slave lake, Peace river crossing, Spirit river, Grand Prairie, Wolverine point and Vermilion. Those are all more or less agricultural settlements. The Vermilion is quite a place.

MEANS OF COMMUNICATION.

The means of communication are trails and water routes.

At Fort Smith there are rapids sixteen miles long on the Great Slave river. If those rapids were overcome by a canal, and the chutes on the Peace river for about three miles, in all about 20 miles of canals, it would give about 3,000 miles of continuous navigation through that country.

There is a large tract of country there capable of sustaining an immense population, following agriculture, mining, fishing and lumbering. In the event of a large population being there and having a large surplus of products, the idea of the pioneers is that those products would go west; that is, if a railway is built through the Pine Pass.

Mr. Bredin was told by the secretary of the Grain Commission that was travelling around last year, that if they had an eleven-cent rate from Edmonton to the coast, the grain producers in Peace river would be in as good a position as those around Winnipeg to-day, and he claimed the Grand Trunk Pacific would be able to give that rate. This gentleman said the Grand Trunk Pacific people claimed that their grades and curves would be so favourable that they would be able to give an eleven-cent rate, and they could ship either to the Orient or England by the Pacific coast. Everybody in the Peace river district believes in the Hudson bay route. A railway from Peace river would tap that country, and if Fort Churchill is a good harbour, communication could be made from Peace river to Churchill, and that would furnish a good outlet to Europe.

In speaking of the eleven-cent rate, witness referred to a route from Edmonton to the Pacific coast. That is on wheat. He did not know whether it was on one hundred weight or a bushel, but the secretary of the commission told him that if they had an eleven-cent rate from Edmonton to the coast that they would be in just as good position to ship wheat as Winnipeg is. Wheat would then be carried from that point on the coast to the British market. If the Hudson bay route was opened, it would be very much better than that. It would be very much shorter, and a great deal of time would be saved. The people of Athabaska would be as much on the front as they are at Fort William. The witness had never heard of wheat being shipped from the prairies to the Pacific coast and to England. There is a mill in Hong Kong that can grind three million bushels of wheat a year, and they are going to double their capacity, so that they will grind six million bushels.

EVIDENCE OF FRED S. LAWRENCE, JUSTICE OF THE PEACE OF FORT VERMILION, PEACE RIVER, HEARD BEFORE THE SELECT COMMITTEE, APRIL 3, 1907.

Mr. Lawrence, whose name is familiar throughout the west on account of his services in connection with original research and systematic exploration, explained that his father went out to the Peace river from Montreal in 1879, in the employ of the missions, becoming at once interested in the problem of making the missions and Indian schools in the Peace river, and the whole northern country self-sustaining. On account of the experimental work done in this desert country by his father and his family, they had come to be regarded as a freak family. His father succeeded with his experiments, so much so that witness got the idea into his head that it might be a good thing to try agriculture as a business, and follow it up by the milling industry. That is how the Peace river country at the present time is being known to the world as a grain-raising district, and not as a trapping or hunting settlement. The settlement of Fort Vermilion is in latitude 58½, almost as far north as the northern part of Labrador.

It had been supposed for many years by the majority of the people of Canada as well as of the other parts of the world, that the country to the north of the present city of Edmonton is a wilderness, a country entirely unsuited for settlement, suitable only for Indians. One white man once said, it was no place for a white man, but witness could show that it was a fine country for white people to live in.

AGRICULTURE.

As an example of what the Peace river country can produce, Mr. Lawrence laid upon the table a sample of No. 1 Hard wheat, raised there last year. He explained that he had obtained the sample from the miller in charge of the Hudson Bay Company's roller process flour mill at Vermilion, who told him that it was an average sample of the 22,000 bushels he had in the mill at the time. It was not a selected sample, but only an average of the wheat in hand at Fort Vermilion.

The grain raised there last year and for some time past has been of the quality known as the Ladoga, a variety introduced there by the Lawrences, and obtained from the experimental farm at Ottawa, some years ago. It all started from a two-pound sample. They tried Red Fife and other varieties, but in the early times, not understanding the conditions of the soil and climate, they found the Red Fife and other wheats were not as successful as they wanted them to be, so they tried the Ladoga and Onega wheat. The Ladoga proved to be the best, and in the years following the first experiment they had enough seed to discard the use of other seeds, and sowed the Ladoga wheat exclusively.

Mr. Lawrence said he presumed that at the present time this variety of wheat, which was Ladoga, would be so different from the Ladoga wheat that is raised in Ottawa, that they would bear no resemblance to each other, because this wheat used to be a soft wheat, while the sample produced, and which was just as it came from the field, is called a hard wheat by men who understand milling.

Last year the witness tried four acres of Red Fife wheat, and sowed it alongside of the Ladoga, and it ripened on the same date as the Ladoga. He has cut spring wheat fully matured in 86 days.

As to the soil, many supposed that the Peace river valley, as a valley, was a low lying section of land in the bottom of the river. It is spoken of as 'The Valley' by many people, and they think that it extends from the mountains on to the Arctic ocean

or somewhere else, and is a low valley perhaps two or three miles wide, covered with prairie, and that all one has to do is to sow the grain in the ground, and harrow it in without ploughing or any cultivation, and raise 150 bushels to the acre. But those residing there do not find any such condition as that.

FLAT AND TABLE LAND.

The river bottom proper only consists of points or flats in the bottom of the bed of the river, which 'bottom' is practically about two miles in width, whereas the great Peace river valley proper, what is properly called the Peace river valley, is in reality a broad tract of country. When you once get on to the height of land, this so-called 'valley' covers 300 miles in width, and extends from the Rocky mountains on to Lake Athabaska, into which the Peace river drains. The banks are very high where the Peace river leaves the mountains—that is the banks of the river to get up on what is spoken of as the height of land. At Fort St. John the banks are about 1,000 feet in height, and it would be quite a problem for a farmer living up on the height of land to get water from the river. When you reach the Peace river crossing, which at present is the terminus of the road or trail from Edmonton, the usual route to the north, the banks are 800 feet in height, and where the road winds down the bank to get into the valley or bottom of the Peace river, it is about one mile long, that length being necessary to get suitable grade to get down to the bottom of the river.

From the Peace river crossing as the river swings to the north and east, the banks gradually become lower, and when Wolverine Point, about 200 miles to the northeast of the Peace river crossing is reached, the banks are about 200 feet in height. From thence to Fort Vermilion the banks become lower, and at Fort Vermilion you find the banks from 100 to 150 feet in height.

You will find the same conditions in the upper part of the river as in the lower. It makes great bends, and on alternate sides of the river you find wide flats, where there is probably the richest soil there is in that northern country, made up of alluvial deposits, all black soil. There are places on the lower parts of these points which get flooded, perhaps once in seven or eight years. Nearly all the points, however, are above the high water mark, and when these flats are cultivated, the soil yields the heaviest of crops. On these flats cultivation of the soil was first undertaken in that part of the country, and it was supposed by many that they comprised the only part of the Peace river or northern country from Edmonton into the north that was suitable for cultivation. For many years experiments were carried on on the flats. People supposed that when they undertook the cultivation of grain on the height of land they would get into the muskeg and swamp that adjoined the river in many places, and grain could not be raised; but this has been proved to be a fallacy. The sample of grain witness had produced, was largely taken from the height of land or table land near Fort Vermilion. The table land is sometimes called 'bench land,' and this bench land in some places is very wide. There are places in it, as at the south of Fort Vermilion, and to the north and west, where there is 100 miles of this land on each side of the river before you come to the mountains.

This land is not all suitable for cultivation. It has its swamps and its muskeg, and its low patches of land, that you will find in almost any country where you have a large growth of scrub timber, but the larger part of this land as the witness had found by travelling over the country away from the river, is suitable for settlement.

Witnesss produced photographs of the grain raised on the soil that was formerly covered by timber—low land and timber. One was a photograph taken last fall of grain that was raised on land which had formerly been covered with bush. It was low land that appeared to be of no use whatever, covered with a thick growth of poplar and willow. Witness also showed a photograph taken by himself of wheat cut during the first week in August.

Mr. Lawrence also showed a photograph of a field of potatoes in bloom. During the month of July they have at Vermilion an occasional frost that sometimes cuts the potato vines down, but never puts them back seriously—just enough to show the effect of the frost on some of the top leaves. The potato vines, however, often show no sign of frost until they are ripe, and the potatoes obtain their full size and are matured. They had never had July frost severe enough to ruin the potato crops. These frosts are very slight.

Last summer Mr. Lawrence planted his garden during the week following May 24, and he planted tomatoes, cucumbers, peas and other vegetables. Last fall, during harvesting, his family had squash pie that was made from squash ripened in their own garden. The squash were raised just the same as the peas and other vegetables and took their chances, no hot-bed and no special care, and he also raised cucumbers and tomatoes. The tomatoes did not ripen, for before they had a chance to freeze they were taken up. The witness thought that with the care such as is given to these things in Manitoba and other parts of the northwest, planting these tender vegetables early in hot-beds, and giving them care, the same success could be had in raising tomatoes, squash or other things of that kind as is had in Manitoba and other districts. At the Peace river crossing tomatoes were ripened last year in the open garden. Other garden vegetables, such as cabbages, and so on grow very well. He has raised cabbages at Vermilion 18½ pounds in weight, and swede turnips are raised in the open field. Out of a three-acre patch he had selected turnips, and a great many of them weighed from 18 to 25 pounds. They were of the purple top variety. They had no special attention or care, and they were good sound turnips. Although the season is none too long for the ripening of wheat, as has been found in Manitoba and the northwest, in order to be successful, the grain must be sown early, just as soon as the frost is out of the ground enough to permit the cultivation of the soil.

THE CULTIVATION OF WHEAT.

Mr. Lawrence explained that he had farmed at Vermilion for over 20 years, and had never had a failure in wheat during that time, although he had as low as 5½ bushels to the acre. There was one very dry season which reduced the average, but there was always a certain amount of grain raised there that was good for seed and grinding purposes. There has never been a complete failure from frost or any other cause. They have no rust on the wheat up there.

He had raised as much as 66 bushels of wheat to the acre. That was the biggest yield, and accomplished without any fertilizer whatever.

The witness drew the attention of the committee to the fact that some years ago Dr. Dawson went through the Peace river country and reported that a large part of it was covered with muskeg and would be permanently unsuited for agriculture. Four years ago the witness took a trip from Fort Vermilion through Lesser Slave lake, through an unknown country 250 miles. Later than that he travelled away from the Peace river about 50 or 60 miles, and saw something that gave him an idea of these muskegs. The muskegs had covered some large patches of that country, and the moss was about three feet in thickness. There had been large tracts of this moss burnt out. Forest fires had been running through there, and Mr. Lawrence supposed that the fire burnt thousands of acres that had formerly been muskeg, as shown by these large patches of moss, sometimes a few feet across and sometimes larger, which was left standing, where the muskeg had been. On this burnt area the witness saw grass from four to five feet in height. There were thousands of acres of it covered with the red-top grass, which is the standard grass of the west. The reason these muskegs had been there for so many years was that the moss formed a great sponge and retained the moisture. But when all that land is drained, and the moss removed, it will certainly raise good crops of grass, and where grass can be grown, grain can be raised. There

would be trees in part of the muskegs which would keep the sun from it, and it was only where the fires had had a chance to work in on the edge of the muskegs and make a start on the moss that they had been burned out.

Mr. Lawrence stated that he would say that about one-tenth of the district to the north is covered with moss. To the south of Grand Prairie through to the district some distance to the northwest of Edmonton, towards the Sturgeon lake, there is a large proportion covered with moss, and Dr. Dawson may have intended to refer particularly to that district. Witness had been over the district between Fort Vermilion and Lesser Slave lake very thoroughly, and could speak from personal observation. To the south side of Fort Vermilion and to the west there is a tract of fertile country, varying in width from 100 miles down to 35 or 40 miles, and it is in this part that one-tenth is covered with muskeg.

The heads of wheat at Fort Vermilion often would grow to the length of six inches, and at times he had counted 65 kernels in one head of wheat. That head would be taken just out of an ordinary field. That only goes to show how by selection and careful cultivation you give a soil a chance to show what it can do. He did not mean that that would be an average for a field, but he knew he often had found such heads.

FALL WHEAT AND SPRING WHEAT.

There is one thing which had been found to be a great drawback to the Peace river district, and that was the spring drought. There is not sufficient rainfall every spring to start the grain as it should be started and have it growing in a few days. Sometimes wheat planted in the late spring will remain in the ground for days before it will germinate, or if it germinates and starts to grow, it will barely hold its own for some time, even until the latter part of May when the spring rains commence, and then you can fairly hear it grow. That could be avoided by better cultivation and earlier sowing. Sometimes the wheat which only started with the spring rains in the latter part of May would grow very fast and very rank, and oftentimes would not ripen before the frost would come, on account of having started too late. Owing to the occasional dry springs causing these troubles, he decided to try experiments in fall wheat, and at the first experiment he carried out he grew a small quantity of 'Golden Chaff,' but not understanding the conditions under which fall wheat should be raised, he did not make it a great success. Not that it was a complete failure, but he did not get very large returns, although he gathered off the field heads of the wheat fully matured, large and plump, ripe on July 18. Since then the provincial government is giving some assistance in getting seed into that country, and this year the witness has forty busels of fall wheat under experiment, and he has 50 bushels more ready for experiment next year, so that he expects in the course of a few years to have something more to say about the fall wheat in the Peace river district. He thinks the fall wheat will do better in the northern part of Alberta than in the southern, because once the snow comes it remains all winter, and the fact of the spring being very warm and dry would push the fall wheat right along, and it would probably be up six or seven inches in height, before the spring wheat would be up above the ground.

Apparently there has not been much winter killing, but the first experiment only has been carried out, and the witness could not tell from one experiment what the yield would be. But the fact that the fall wheat did live through the winter and matured early was sufficient assurance that it would be successful if the experiments were carried out properly.

As to spring wheat, it has been matured and cut 86 days from date of seeding. Last season (summer, 1906) wheat cutting would have commenced in the last of July, but two days of rain delayed the starting of binders. In wet seasons wheat ripens about August 20. The Red Fife tried last year gave as good returns as the Ladoga wheat and was cut at the same date. This had also been sown on the same date and on the same kind of soil as the other wheat.

Barley sown after the middle of May is usually ripe in the last week of July.

The continuous daylight with about 18 hours of sunlight account for the rapid growth of all vegetables in these parts.

SMALL FRUITS AND FLOWERS.

Mr. Lawrence stated that he had not had any success with the raising of small fruits from seeds, for the simple reason that he had not given the proper care as labour is scarce. He had planted small fruit seeds, which had been sent to him from the experimental farm, and they had been largely left to take care of themselves.

Wild raspberries, gooseberries, strawberries, currants and cranberries grow in abundance. The raspberries follow forest fires, and there are thousands of bushes of raspberries going to waste in that country fully as fine in quality and size as the witness had seen raised in the fruit gardens near Montreal. There is a wild strawberry that grows very well. A cultivated berry should do better. He had not cultivated strawberries yet for the simple reason that labour is so scarce. From within a few days of the time that the snow goes off the ground in the spring, until vegetation stops in the fall, there is a continual changing of colour and variety of wild flowers, both on the prairie and in the bush and woodlands. Every week you will see a change in colour from one end of the season to the other. There are a great many varieties and they grow in large numbers.

Two years ago Mr. Lawrence tried twenty-eight varieties of ordinary garden flowers, such as sweet peas, pansies, &c., from seed, and out of the lot there were only two that did not prove successful in the open garden.

With regard to cattle, they will do well in that country if there is food provided for them. You would have to feed them from six weeks to three months in the winter, depending on the season. In a winter like this year it would be necessary to feed them about four and a half months. There are two large dairies at Fort Vermilion. It is a good country for dairying. The water is good and plentiful.

The witness had never had any sheep there; there are too many dogs and cayottes. There are no sheep in the Peace river country. The timber volves are very numerous and come into the yards often. If it were not for the dogs and timber wolves the sheep would do well.

The native horses winter out on the plains.

FORESTRY.

With regard to timber, the witness explained that in the valley of the Peace river, the bottoms of the river, the islands—and there are large islands in the river—and the points the witness mentioned before, are largely covered with a heavy growth of spruce, which grows to a large size. The largest he had ever measured was four feet four inches in diameter. A tree of that kind would carry its trunk well up, clean of branches 40 or 50 feet up. Of course that is an unusual size, but timber three feet in diameter is common on the hills and in the lower part of the bottoms. There is no oak, but there is spruce, birch and poplar. The poplars grow to a large size. The cotton wood often grows to four feet in diamcter, and the poplar grows to a diameter of two feet.

GAME.

The buffalo, Mr. Lawrence stated, never come as far west as Vermilion. East of Vermilion, about 100 miles, buffalo may be found. His brother has been in that country, and he told witness that one buffalo could make a great many tracks. He saw the tracks of a herd, and he estimated that the entire number in the whole country

might number about 500. The wolves kill off the buffalo calves, and some of the year-olds. The local legislature give a small bounty, which is no inducement for the people to hunt the wolves. There is no protection for the buffalo other than that afforded by the game laws, and the wolves do not observe them very well.

MINERALS.

Mr. Lawrence remarked that he did not know much about the mineral resources, but he knew that at the Peace river crossing and below it there are small seams of coal jutting on the banks of the rivers. Twenty-five miles below the Peace river crossing there is a spring of mineral tar which witness had seen himself. Near that there is a spring or jet of gas, which the witness lighted last winter on an election trip and boiled his tea kettle over the flame. In the lower part of the Peace river, not very far from Fort Vermilion, some years ago the witness found a spring of petroleum in the high bank, and just above Fort Vermilion there was a smoke which resembled a large camp fire on the bank. Just what made the smoke Mr. Lawrence did not know, but the ground was burned red, like brick, and cracked, and so hot it could not be walked over with moccasins. They did not investigate. The smoke was coming out of the ground in several places, and he supposed it was a bed of coal that had been set on fire in some way. The fire was put out one season by high water. It had burned for three years. That was one of the occasions when several parts of these points were flooded by the river.

GYPSUM.

Below Fort Vermilion there is nothing that the witness knew of in the way of mineral or other deposits, excepting that in the Upper Peace river there are mica deposits. In the lower Peace river there are large cliffs of gypsum.

CLIMATE.

Mr. Lawrence stated that he found the climate to be much the same as in other parts of Alberta. In the Peace river there was probably more uniform cold through the winter and less storm. Owing to the country being covered by scrub bush, there is less liability to storm. The country is sheltered more or less and winds do not get such a sweep as they do in the plains. This winter (1907) when he left the Peace river country, in January, he found the snow to be one foot less than it was further south at Edmonton. The snow was about two feet deep throughout the Peace river valley, and after passing the height of land on his way to Lesser Slave lake, he found the snow to be very much deeper, and it kept getting deeper as he went towards Edmonton.

What is known as the Upper Peace river district is very much the same as at Edmonton. The snow does not get deep and goes away earlier. The Chinook winds have more effect there than in the eastern districts. The snow this year (1907) in the Peace river district will be about two and one-half feet in depth. Occasionally it is deeper, but the snowfall is very uniform one year with another, as well as the cold.

Winter sets in in the Lower Peace river district about the middle of November. The first snowfall may be expected about the middle of November, sometimes later, and occasionally earlier. Those who are interested in grain begin to look for the first frost about September 1. They sometimes get frost before they look for it, and it sometimes stays away a week or ten days after they look for it, but they generally get it about the first week in September.

Frosts are more common in spots surrounded by trees and brush, and in the opinion of the witness, when the country has become opened up more, and there is more clear land, there will be little danger to any cereals or to hardy vegetables.

The season is backward in some parts of the Peace river district as compared with

southern Alberta. The snow takes a long time to get off the ground. They occasionally commence seeding in the Peace river district during the first week in April, but the average time for seeding in that part of the country to commence is April 26. In the Upper Peace river the average time is about the middle of April. Their season is earlier, but in the Lower Peace river they have had more success than those in the upper district have had in the raising of wheat, although their season is earlier. Just why witness did not know. The settlement at Fort Vermilion is to-day raising wheat, which is ground into flour at the local mill and shipped into the Mackenzie river country.

SETTLEMENT.

The settlement at Fort Vermilion consists of about 500 people, composed of white people and English-speaking half-breeds. The total production of wheat there last year would be 25,000 bushels, the average being about 21 bushels to the acre. Of oats and barley about 10,000 bushels, mostly barley, was raised. The wheat was ground and used to make bread for the people out there. The first market is at Fort Vermilion and the surrounding points, and whatever surplus there is is shipped down the Peace river into the Mackenzie river district.

MEANS OF COMMUNICATION.

Vermilion, Mr. Lawrence pointed out, is a pretty good distributing centre for the lower part of the Peace river.

He did not know how far it is from Churchill, but would assume about 900 miles. From Vermilion to Edmonton by the road is 700 miles, and Vermillion to the coast would be about 900 or 1,000 miles. It would be about half way between Hudson bay and the coast, and the witness expressed the opinion that before many years there would be a railway from Hudson bay right through the main part of the Peace river to the coast, and whatever was shipped to the markets of Europe would undoubtedly go by Hudson bay. If there was a railway down to Lake Superior, the cost would be great. The people of the district are satisfied that the Hudson bay route is a feasible one.

EVIDENCE OF J. K. CORNWALL, HEARD BEFORE THE SELECT COMMITTEE, APRIL 5, 1907.

Mr. Cornwall explained that he is a practical 'river man' of seventeen years' experience, and at present engaged in the transportation business on northern waters. He has lived in the north country for ten years. He considers the waterways of the Mackenzie watershed as perhaps the finest in North America.

The most southern point reached by navigation on the Mackenzie watershed is at Fort McMurray at the junction of the Clearwater and Athabaska rivers, a point about 275 miles north, and a little east of Edmonton. The distance from McMurray to the Arctic ocean is approximately 1,600 miles. In all this distance the connected waterways are navigable for steamers that are now plying upon them, and have been for twenty years. There are in this long system of waterways two distinct divisions.

One extending from Fort McMurray to Smith's Landing is 300 miles in length, and at low water you are restricted to a draft of two feet. That is only in the fall of the year, when the waters are usually low in the north. During the spring season and summer season there is ample water for any draft that you might see fit to load on a steamer of the type that has been plying on this stretch of water for 20 years, that is the stern wheel type.

From Smith's Landing to Fort Smith is a distance of 16 miles, and there is a series of falls occurring in this stretch of the Slave river of about 250 feet in all.

From Fort Smith to the mouth of the Mackenize the type of steamer now plying is the propeller type, and the greatest draft that they can load during the low water season is five feet. Propeller steamers are the type most suited for this end of the route, and vessels of that type have plied there for 20 years.

The Hudson Bay Company are now building at Fort Smith a steamer to take the place of the old steamer *Wrigley*. It will go into commission in the spring of 1908. This steamer is being built at great cost, and when completed will bring the 'Land of the Midnight Sun' two weeks nearer Edmonton, on account of superior speed and equipment.

With a tramway at Smith's to give despatch to the handling of freight and passengers that are, up to the present time, being handled in the old primitive way (the portages on the river being made with the assistance of carts and oxen), and if in the future there is railroad transportation from Edmonton to McMurray, it will be a very simple matter to go from Edmonton to the Arctic and return in 30 days.

From McMurray up the Athabaska, for a distance of 100 miles, the physical features of the river are of such a nature that steamer navigation is impossible. The making of it navigable for steamers would be so costly that the amount of business now and in the immediate future would not warrant the improvement of that part of the river. If it was otherwise the Mackenzie watershed could be tapped at Athabaska Landing by steamers which would bring the watershed then to within 100 miles of Edmonton. As it is, McMurray is the nearest point at which a railroad could touch and tap this immense waterway.

The stretch of waterway between McMurray and Smith's Landing has another important connection. By swinging to the west at Lake Athabaska, and going up the Peace, navigation on this river for a distance of 1,000 miles is found with one interruption, namely, at the Vermilion Chutes, which occur five miles above where the Little Red river puts into the Peace and causes a break in this stretch of navigation. A tramway of a mile and a half in distance would have to be built at this point. A tran-

shipment of goods would have to occur here to connect with the steamers now plying from this point, above the chutes, to Hudson's Hope, at the foothills of the Rocky mountains, a distance of about 650 miles.

IMPORTANCE OF THE PEACE RIVER.

The Peace river practically passes through the centre of the vast Peace river district, and in the development of this district will always play an important part, as navigation is practically without a dangerous rapid or obstacle of any kind throughout its whole course, with the exception of that one referred to at the Vermilion Chutes.

There is also another connection with the main system. By swinging to the east upon entering Lake Athabaska, navigation for a distance of 250 miles is found, practically due east by the compass, but perhaps a trifle to the northward. From the most extreme easterly point touched by navigation on this route it does not appear to be a very great distance on the map, to touch a point that will be traversed by the proposed Hudson bay railroad, and from information that the witness had from the hunters and trappers of that district, it is not a difficult country to travel in or to construct a road over.

You cannot go into Great Bear lake with steamers; Great Bear river is not navigable. Great Slave lake, however, is navigable throughout its whole length and breadth. It is practically an inland sea.

As to getting from Great Slave lake to Hudson bay, the height of land would have to be crossed to tap the Hudson bay watershed. Back in the seventeenth century the Hudson bay people sent a man up there to Hudson bay; but by missing his way at a point on a river where it widens into a large lake, and by taking the wrong branch, he missed discovering what other people have discovered since. Handbury and Fairchild, of the Tyrell party, made the trip through from Great Slave lake to Hudson bay without any great difficulty. There is no question, in Mr. Cornwall's opinion, that had the man sent out by the Hudson Bay Company discovered this route, the north country would have been exploited for fur at a much less expense by this route than by the old route by Nelson river, Lake Winnipeg, the Saskatchewan river, the Clearwater, Athabaska, the Lesser Slave river and the Peace. This is a long, tortuous and costly way to bring goods into the country as compared with the other route referred to, if it had been discovered.

As to the number of months in the year that this stretch of waterway in the Mackenzie basin is open for navigation, Mr. Cornwall stated that all of the rivers running to the north and east with their source in the Rocky mountains, namely, the Athabaska, the Peace and the Liard, 'go out' between April 20 and May 1, on the average. They are all navigable a week after they go out, but where these rivers enter lakes the navigation opens later, it being not much before the first week in June when the lake ice breaks up and disappears. Navigation is opened on an average about the middle of June.

The Mackenzie river is a tremendous stream of water, being from two to four miles in width for its whole length. It is navigable all the way except at the mouth, where it spreads into a great many branches, and like all rivers of that kind, bars occur, and they would have to be dredged, but that is a very easy matter as the bars are short and even now can be cleared with a whaleboat in a good heavy sea. You can go down the Mackenzie as late as the latter part of October, so that there would be practically five months of navigation.

Witness did not suggest the construction of canals on the Athabaska and Peace to surmount the obstacles described, but tramways. The volume of business would not warrant the expenditure on canals, but by the construction of 17 miles of trams, and a railroad to McMurray, 3,000 miles of the finest river and lake navigation in North America can be tapped.

This waterway runs through a country of vast natural resources. Timber, asphaltum, copper, salt and fish are some of its natural resources. The agricultural possibilities of the Peace river district are unsurpassed in the northwest. As an illustration of the latter, the witness explained to the committee that he was in possession of a letter dated two weeks previous to that date, informing him that 5,000 sacks of flour will be ground at Fort Vermilion this winter. Fort Vermilion is 670 miles north of the United States boundary, and is in latitude 58·30. The Hudson Bay Company has a large and excellently equipped flour mill there which cost $45,000.

SECTION C.—EVIDENCE RELATING TO THE NAVIGABILITY OF HUDSON BAY AND HUDSON STRAIT, AS AN ALTERNATIVE MEANS OF COMMUNICATION WITH THE NORTHWESTERN REGIONS OF CANADA.

CONTINUATION OF THE EVIDENCE OF A. P. LOW, B.Ap. Sc., F.R.G.S., GIVEN BEFORE THE SELECT COMMITTEE ON FEBRUARY 7, 1907.

Mr. Low having completed his evidence as to the resources, &c., of Ungava and the country north of the Saskatchewan watershed, was asked a number of questions regarding the natural features of James bay and Hudson bay, and others on the general question of the practicability of the Hudson bay route.

Mr. Low stated that there are really no good harbours on the southern part of James bay. The water is shallow, and at tide, rises six or seven feet. There are a number of bars in the mouths of the rivers, so that the channels are in some places crooked and generally obstructed and narrowed up in a number of places. If these harbours are to be made fit for ocean-going steamers, there will have to be considerable expenditure upon them.

These harbours could be dredged out, witness thought. The bottom is mud and boulders and drift. A harbour for smaller craft, twelve feet or so of water, could probably be got. Harbours of that draught would be more easily obtainable.

Moose river is at present the best known harbour there. When ships come down into that part of the bay, the captains can generally tell their distance from the land by the depth of water ; it increases in depth about six feet to the mile. They come in out of the fairly deep water approaching the mouth of the Moose river till they get into about three fathoms, and then they look for a buoy to the narrow entrance to the river. There is a bar ten miles long which completely crosses the mouth of the river, and there is just a narrow entrance to that bar, on which there is about fourteen feet of water at high tide, and all ships have to go through it. The Hudson bay post is fairly well channelled and beaconed. After passing over the bar they go up the river about six or seven miles to the anchoring place, where the water is 18 feet deep at low tide, and coming to the present Hudson bay post there are several places where there is only six or seven feet of water, and some of these are narrow, so it is fairly good navigation to get up to them.

Mr. Low explained that he had never been in the Albany river, but it is bad; in fact, it is worse than the Moose.

There is a harbour at the mouth of the Nottaway river at which he has never been either, but they say there is a decent three-fathom channel up to it through the middle of Rupert bay. For a long distance you do not get more than three fathoms of water, and to get out of that at low water tide soon gets one into difficulty. He had a small craft that drew three feet of water, and he used to run on ground in Rupert bay regularly, just simply through not knowing the channel. The mouth of the Rupert river is about in the same state. There is your channel that runs out and meets the channel coming from the Nottaway, and you have to follow that up. There are only two or three fathoms of water in these channels.

There is not much fog in the bay. The weather is fairly clear in the summer time.

Churchill is the only present natural harbour on the south side of the bay. That is the first harbour going north.

To the north of Churchill there are a number of harbours in the inlets and bays, but the ground outside is bad, and until the channels are properly dredged there is great danger of running on shoals in the northern part between Churchill and Fullerton. York Factory at the mouth of the Hayes river is not a very good harbour. There are a great many bars off the mouth, and the ships anchor seven or eight miles below the Hudson bay post.

HUDSON STRAIT HARBOURS.

There are plenty of harbours on both sides of the Hudson strait. One is on the north side and east of Digges island, but has not been properly examined yet. But there is no doubt there are a number of good harbours there. On the south side the witness examined the coast from Cape Wolstenholme to the south part of Ungava bay, and there are a number of very good harbours along that coast. Between the end of July and the end of September when he was there, the strait was not quite clear of ice, for some was floating in the strait.

The straits are practically never clear, but the ice that was in there after the middle of July until November almost would not harm an ordinary vessel. The great danger in the autumn in the navigation of Hudson strait is the stream of Arctic ice that comes down from the Arctic ocean and from Baffin bay. Then from the end of September snow squalls are frequent. The navigator is in far more fear of snow squalls than fog. Late in September there is a heavy fog that rises from the water, brought on by the excessive cold. When the temperature gets below zero there is a continuous fog that rises from the water, sometimes 100 feet and sometimes 200 feet. You could not overcome that by lighting nor with anything, except getting on the top of the mast and looking over it; it is a light fog.

The strait is navigable from about the middle of July until the first day of November anyway, and a couple of weeks might be added at the end, because the ice in Hudson bay, the new ice, is of no consequence to a ship until it gets to be 15 or 18 inches thick, and not much ice forms before that date. The Arctic ice that comes down Baffin's bay is serious, because it is heavy ice and sometimes it is 40 feet thick. It comes down from the north, and the witness expected that at the end of November and December it is beginning to fill the eastern part of the straits. Part of it sweeps around Resolution island, and witness had seen heavy ice up as far as Digges island, about the middle of the straits, and it is quite a serious thing. That would not be the case every year. If there were high westerly winds it would drive that ice from the coast, and it would pass the straits without coming in.

In the report of his trip in the *Neptune,* Mr. Low had spoken of that ship having got into the ice about July 22, and of having to ram her way through it. He explained to the committee that that was coming out of the bay from Fullerton. They got in the ice just off Cape Wolstenholme. He thought they were too far south and met the ice, but to the north it looked as if they could have had open water if they had kept away from Cape Wolstenholm. Very heavy ice would not come very much earlier than November, because the Baffin bay ice would not break up sooner.

Mr. Low again expressed the opinion that from the latter end of July to the middle of November, from three and a half to four months, there was probably safe navigation, where ordinary iron tramp steamers could be used. He did not mean that it was absolutely free from ice, but sufficiently free to make it safe navigation. The ice would not sink your ship or anything like that. The ice that is met up there is rafted up, and sometimes rafted deep. In the midsummer months it gets warm and more easily broken. The cementing material is practically gone from it. You just run into it and it breaks to pieces, and you see four times as much as you did before.

The Hudson bay ships, as a rule, come into the Hudson bay about the first of August, and the ship from Churchill comes back again about the end of the month. It goes to Fort Charmell in the Ungava river and generally lies there until September

25, when it continues its voyage out, calling at the other places along the Labrador coast, and leaving Cartwright, its last port of call, about the second week in October. They are steamers, but of course they use their sails. The one that supplies that part of the bay and Labrador coast is a sloop of war called the *Pelican*. These vessels are not large enough to carry grain, but small boats of 400 or 500 tons and a draught of 16 or 18 feet.

So far as witness knows there are no glaciers formed in any of the waters of Hudson bay, or any waters flowing into it from the north.

Some years ago large quantities of the Baffin bay ice came down through that channel by Digges island. Witness was in the *Diana* in 1896 and 1897, and she struck there early in January off Digges island. There were quite a number of large pieces of ice came in that way that did not add to their comfort at all. This ice comes in in the winter time, as early as November probably, and remains there until it melts. Some of it is liable to be there in July, but the ice melts very rapidly after the middle of July. It would not impede navigation during the period he had mentioned.

Really prepared steamers could navigate Hudson bay and Hudson strait longer than the period he had mentioned ; you could navigate the straits all winter if you had a specially prepared vessel, but it would be a long voyage.

Except for the ice, Hudson bay and Hudson strait are not difficult to navigate.

The channel to Churchill harbour, Mr. Low said, he thought was about four fathoms. Then it deepens gradually going out, so that if a captain was attending to his soundings he would know when he was coming on to the coast, even if there was a snowstorm. As you come to the bay, these soundings gradually decrease as you reach through the passage between the two islands of Coates and Mansfield; so that while keeping the soundings going you have no danger, or very little, of going on the shoals or anything like that. Nelson is practically the same, except that there is no harbour.

The depth of the water in the channel between Coates and Mansfield island is thirty or forty fathoms, and the width of the channel, twenty or thirty miles. The depth of the channel at Nottingham is 25 or 30 fathoms. What he described as a channel was really a passage out in the open sea.

Altogether the witness considered the Hudson bay route, when it was clear, an even clearer one than via the St. Lawrence. There is at least two months when there is no trouble from ice at all, and when you do meet that loose ice in the summer time there is no trouble. There would have to be several lights established. There would have to be lights at Nottingham island, and probably at Cape Digge. Charlatan island would probably have to be lit at both ends, because it is practically in the middle of the channel, and then there would have to be lights at Cape Chigney and on Resolution island. Lights would also have to be placed at the mouth of Churchill harbour.

CONTINUATION OF THE EVIDENCE OF J. B. TYRRELL, GIVEN BEFORE THE SELECT COMMITTEE ON MARCH 2, 1907.

Mr. Tyrrell's examination as to the geographical features and resources of the region north of the Saskatchewan watershed having been completed, was questioned specially as to Hudson bay and the adjacent country and as to the practicability of maintaining a route of communication via Hudson bay and strait.

Mr. Tyrrell said as he had tramped all round it, he was familar with the country about the bay. Asked as to the proposed route of the railway from Lake Winnipeg to Churchill, he explained that west of the lake for a considerable ditsance there is a great swamp along the Saskatchewan river, but north of the lake you get into a limestone country that has very little soil on it for probably 40 or 50 miles down, till you get to the Grass river. The limestone is fair building stone, similar to the stone at the Stoney mountains and Sulphur mines. Witness did not think that the swamp on the Saskatchewan could be improved. He thinks the grade on the Saskatchewan is rather too low, unless the engineers went down as far as Grand Rapids and worked back from there.

Continuing to describe the route of the railway to Fort Churchill, Mr. Tyrrell remarked that after getting across the limestone country, which has very little soil on it, you get north to the valley of the Grass river, and then you get down to the clay country. Then you go, from where you reach the Grass river down to its mouth in Split lake, over a gentle rolling clay-covered country. None of the hills are probably over 100 feet high. It is just a gentle, rolling country with not very deep valleys. It would be very easy to build a railroad over. From Split lake northward, the railway route as it is marked on the map, runs round by the Fishing lakes. There is a fairly good country along the valley of the Nelson river, till you get north to the Fishing lakes. It is a good agricultural country and an easy country to build a railroad in. Then there is a country that is stony and hilly, covered with jackpine, a sandy, stony country for a distance, it might be of 25 to 50 miles or so. After descending from that you get down to a level or a gently sloping apparently level plain, which is one vast swamp, the only dry places being along the banks of the streams. That plain extends down to the shore of Hudson bay, and a railroad can readily be built on it, as long as it keeps to the dry drained portion close to the banks of the main streams.

SHORES OF HUDSON BAY.

This would bring the line down to Churchill or the Little Churchill, or to the Deer river or any of the little streams that run across that plain. The streams here, as a rule, are cut down 20 to 30 feet. This is very extensive. He would say it is quite impracticable, except with very great difficulty and great expense, to travel across this country in summer away from the streams. He walked across it in winter. This swamp goes right down to the shore of Hudson bay. The country is of the same character all round from Churchill down to Hudson bay. The western side of the swamp land is about 100 miles west of Hudson bay. It only goes north to the woods—within the forest area. North of the tree limit there is no swamp. The mossy swamp does not grow beyond the forest line.

The shore of Hudson bay is very low generally. In many places on the shores of Hudson bay, where the tide only rises eight or nine feet, it runs out ten miles. Mr. Tyrrell said he had been on the edge of that flat country, and at low tide he could not see the water at all; it was so far out.

From the place witness left the Fishing lakes and struck the plain, to the bay, through the swamp, would be a distance something like 100 miles.

The mouth of the Churchill river is an exception to the general character of the Hudson bay shore. There is at the mouth of the Churchill river a rocky hill rising, or at least a mass of rock. The remarks about the shore descending to the bay do not apply exactly to the mouth of the Churchill river. That is the reason Churchill is a harbour. Churchill would be a harbour in low water; it is one of the most magnificent harbours in the world, probably the finest harbour. It is a rocky hill rising about 100 feet high and bow-shaped. Projecting out into the bay is a rocky knuckle on one side, so that in entering the harbour ships have to take a slight curve, but they very, very quickly get away from the influence of the ocean waves At the present time the harbour is about 30 to 40 feet deep. The tide is heavy, and rising from nine to sixteen feet at low tide. The channel is the same width at low and high tide. The channel out into the bay from the harbour is a rock-bound channel, probably one hundred or two hundred feet deep, so that that channel is clear either at high or low water. It is wide enough for a couple of ships to pass, and incur no danger. There is one rock in the mouth just a short distance from the point of the projecting rock he had spoken of, and if that were removed it would widen the harbour and about double its width. The width of the harbour is now about 200 or 300 feet. The entrance is narrow. It is a beautiful harbour for the ships to enter from the ocean. The rock rises precipitately on both sides to one hundred feet. There is no possibility of a ship getting away from it. Where the rocks run as they do at this harbour, it makes a natural slip, about as safe a place to enter with a ship as one could very well imagine. The entrance is from a quarter to half a mile long. Outside of the harbour is the open ocean with its deep water.

Mr. Tyrrell was at Churchill in the fall two different years, approximately in the months of October and November. He reached there October 15 one year, and he was there part of November. In one of his reports he published a table giving the dates of the opening and closing of navigation; obtained from the records of the Hudson Bay Company at Churchill.

CLOSE OF NAVIGATION.

Asked by the Honourable Mr. Ferguson if the Hudson Bay Company placed the information very cheerfully at his disposal, witness replied that the Hudson Bay Company do not like to have their fur trade interfered with.

Mr. Tyrrell left Churchill about November 25 or 29. The bay was open then and there were no icebergs. A ship could not go out and in then. The harbour was closed. The witness arrived at Churchill one year from the north on October 16 in a canoe. He considered if he could travel down the shore of Hudson bay in a Peterboro canoe, and get to Churchill safely with it in two successive years, one year as late as October 16, and the other year as late as the 1st, that a steamer or a well protected boat ought to be able to get through a little better.

The witness stated that he did not want it to be understood that while he was out on the bay up to October 16, that there was no ice forming on the shore. There was ice forming and it was exceedingly unpleasant travelling. He had to go to the shore to camp every night. The ice was not thick and he was able to travel in the canoe. Occasionally he had to shove through the ice. The ice would form on the paddles as he was paddling along. He did not recommend anybody to take the trip down the shore of Hudson bay in a Peterboro canoe, or any other canoe, but at the same time he thought that where he travelled at that time of year, a large and properly equipped boat could travel without any inconvenience or trouble at all. A vessel could go in and out of Churchill on November 1. That is about the latest. As to the time a vessel could enter at the opening of the season, that varies. The opening of the harbour varies nearly a month. The average time of opening, according to the old records, as far as he remembered was June 5, and when it is open it is wide open.

From his knowledge he did not say the bay as far as the mouth of the Churchill river is navigable from June 1 to November 1. He was creditably informed that there is more or less Arctic ice comes down and blocks the mouth of the Churchill harbour for a period in the summer time.

Asked how far up the mouth of the Churchill could vessels go, Mr. Tyrrell explained that as the harbour stands at present, they could only go in about three-quarters of a mile inside the mouth of the harbour, but the rock bound basin is about eight miles long and a mile wide. It is filled with silt from the mouth of the Churchill river, and would have to be dredged, but a harbour could be made with comparatively little trouble about eight miles long. There would no difficulty in building elevators, wharfs and warehouses at the point the vessels would come to.

The witness said it would not be difficult to build a railway from Churchilll to the Peace river country. By keeping a little south it would traverse a good agricultural country, after you get 100 miles from Churchill. By following the lines of the Churchill rather than a straight line to the west, the line would go through a good country.

EVIDENCE OF ROBERT BELL, M.D., C.M., F.R.G.S., C.E., &c., OF THE GEOLOGICAL SURVEY OF CANADA, GIVEN BEFORE THE SELECT COMMITTEE MARCH 12, 1907.

Dr. Bell explained that he had been through Hudson strait nine times. The first time was in 1880 in a ship called the *Ocean Nymph,* a small sailing vessel, and the last time was in 1897 with Commander Wakeham. His trips were distributed over those seventeen years between 1880 and 1897. Commander Wakeham took him out in the *Diana* with his yacht on her deck and let him off at Big island, on the north side of the strait. Then he worked west with the yacht and returned after his survey. They entered the strait on June 22 in 1897, and went completely through and back again before he left the *Diana.* Commander Wakeham lowered his yacht into the sea at Big island and he surveyed the coast westward as far as he thought safe, so as to return and meet the *Diana* there. As he had ten days to spare after reaching Big island, he surveyed the coast for some distance eastward of it.

Dr. Bell was not sure, but he thought that date (June 22, 1897) was the earliest date he entered the strait on any of his voyages. They did not see any ice at the entrance, but encountered it later, especially towards Fox bay. The latest period he passed through the strait was, he thought, with the *Ocean Nymph.* They cleared the strait before the middle of October—between the 1st and 15th he would say. All his trips were between June 22 and about October 10.

In navigating the strait during the season between those dates, with a steamship, they never had any difficulty, nor was there any difficulty with the *Ocean Nymph,* which was a poor ship for sailing. He is of opinion that the straits are navigable for steam merchant shipping during the season between these two dates. He saw no trouble or difficulty, in his own experience, in passing through. In some parts of the strait he saw ice, but it was near the north side. Captain Wakeham wished to land him at King's cape, that is the angle formed by Hudson strait and Fox bay, but owing to the movements of the ice it was impossible at the time. In fact the witness did not want to go ashore there, because the shore was so badly charted he did not feel that it would be safe. He wanted to be picked up at some well-known point, and if he had been landed at King's cape the chances were Wakeham could not find him, nor witness Wakeham. It was agreed, therefore, that the witness should be landed on Big island. There the *Diana* picked him up again. When the ship came on the date appointed, it was a stormy day and the captain could not take the witness on, but came back the following morning.

Dr. Bell never passed through on a very powerful steamer with high speed, in fact, on no more powerful steamer than the *Neptune.* He went through on the *Neptune,* and afterwards on the *Alert* and then on the *Diana.* The *Neptune* has only 110 nominal horse-power, but she makes eight knots an hour easily. The *Diana* is smaller, but more easily handled, and did very good work. On the *Diana* expedition the greatest trouble they had with ice was off the east coast of Labrador. Until the middle the summer set off East Labrador is filled with ice for a long distance out from the land.

The *Alert* was specially built for ice. She was very strongly built. Up to the date the Dominion government had her, she had been further north and further south than any other ship in existence. She was a mass of wood with little accommodation. The *Neptune* is also a very strong ship.

The *Neptune* and *Diana* were built for use in the seal fisheries where they have water to move about in. They do not get into trouble needlessly, do not break the ice

for the sake of breaking it. Witness never heard that the strait was frozen across in winter. There is ice there, but always more or less open water with it, at all times. Witness had heard of Eskimos crossing the strait on ice floes, but he had no evidence that they had actually done so. Their home is on the ice—they live there—build snow houses, kill seals, and keep iglos warm with lamps fed with blubber. If any Eskimos ever crossed the strait on the ice they did so by watching their chances and passing from one field of ice to another If they did not succeed in crossing, they would not mind it; they would go back.

CURRENTS AND TIDES.

A current runs both in and out of Hudson bay. It runs in with the tide for a time, and then runs out again. There is also a constant set westward on the north side of the strait and a set eastward on the south side. If you observed an individual mass of ice, you would see it pass both ways twice every day until it gradually worked its way inward, if it was on the north, and outward if on the south side of the strait.

Dr. Bell said he thought there was not more ice at the entrance of the strait from the ocean than found further west in the strait. On the average, he had seen more iee towards Fox bay. A good deal of the ice in Hudson bay comes from that direction.

The rise and fall of the tide at Big island is thirty-one feet, and in Ungava bay it rises some 50 feet. It is the second highest tide in the world. Fox bay is a basin which is not on the route of ocean navigation. The reason why there is such a high tide in Ungava bay is probably that the tidal wave from the Atlantic is met by the curving east Labrador coast and the land to the north, heaping the water at the entrance of Hudson strait. At all events, the whole appearance in Ungava bay is altered between high and low tide. Dr. Bell said he had heard of a ship anchoring in deep enough water, and in the morning the captain found his ship resting on a rock so that he could look down hill all around him, and he was afraid the ship might roll off.

The depth of water in the strait is from 300 to 340 fathoms near the entrance from the Atlantic ocean, west of Cape Chudley. The depth depends on where you happen to take soundings. During the voyage the witness made on the *Ocean Nymph,* they spent half a day taking soundings, but the water was so deep that it took all hands a long time to haul up the lead by a hemp rope.

Roughly speaking, Hudson strait is 500 statute miles in length and averages 100 miles in width. If Ungava bay be called part of the strait, it would be 250 miles wide there.

The depth of the channel between Nottingham island and Cape Wolstenholme is probably 30 or 40 miles across. The hills are very high—2,000 feet to 3,000 further inland, and the water is very deep in that channel. The deep channel runs up the middle of the strait and passes out of the western end between Nottingham island and Digges islands, off Cape Wolstenholme. These are not very large islands. They discovered a harbour on the southwest side of the western islands. The water continues deep between Mansfield island and Coates island, which is a very wide channel. These islands are of limestone rocks and are not so high and rugged as the mainland. Witness did not remember seeing any ice after getting clear of King's cape. He had no trouble from the ice west of Fox bay. He had passed between Cape Wolstenholme and Mansfield island once in the *Neptune* going south, and had to stem a very strong tide. It was all the ship could do to hold her own. The captain did not anticipate any trouble, but had great difficulty in stemming the tide. That is not the channel that would be used going to Fort Churchill; the current seems to set north close to the east main coast. You would not get the same current in the other channel; it seemed to hug the main shore. The expedition had a station on Nottingham island, and when they left the island they did not find any difficulty between Mansfield and Coates islands. The strong current mentioned might have been an exceptional case during six or eight hours

when the spring tide was setting out at its worst. At other times they might have had slack water.

There are no serious shoals in the route between Coates island and Mansfield island and through the strait out to the ocean, and the land is so high that even at night you can see the outlines of the hills against the sky, but an occasional light, and a telegraph line connecting them would be useful. There is one island, Charles island, with one hundred miles or more to the north of it in which to choose your course. You need not go near that island. A stranger by keeping clear of what he sees would not be in any danger of striking rocks. Dr. Bell said he did not know any more desirable piece of navigation in the world, excepting the middle of the ocean, and even then a common sailor who could not take an astronomical observation could sail through the straits with perfect safety. That is what Henry Hudson's men did after putting him and part of the crew into an open boat and leaving them behind.

AIDS TO NAVIGATION.

In his opinion all that is necessary to be done in the way of aids to navigation through the strait, the whole distance from the Atlantic ocean to Hudson bay, is the installation of probably three lights on each side with telegraphic lines connecting them. Even one light in Hudson strait would be better than none, two better still, and six would be still more so.

As to the preparation of reliable charts of these waters, a good deal requires to be done yet. The north side from about Charkbok to a point north of King's cape, or King Charles cape, is badly charted, so badly that there are two lines, one overlapping the other, representing the same coast. The chart makers were so uncertain as to where to place the line that they put both down. The existing chart was made in London largely from information furnished from time to time by captains of vessels. Afterwards Lieutenant Middleton, of the Royal Navy, sailed through the strait and bay on a Hudson Bay Company's ship, and made observations for latitude and longitude which improved the chart a little. The department has a geological survey of the east coast of the bay. The witness surveyed that coast from Moose Factory northward, that is the east coast of James bay and up Hudson bay to Cape Dufferin. The rest of the shore north of Cape Dufferin was surveyed by Mr. Low, up to Cape Wolstenholme. Dr. Bell came south himself in a small boat from Digges islands to a place called Ponga. He thought it was the place where Henry Hudson's men went ashore and were attacked by the natives. The mutineers who put Hudson ashore had wintered in 1610-11 at the mouth of the Nottaway river. They had passed a miserable winter. Soon after sailing on the return voyage in spring, the men mutinied and took possession of the vessel putting the officers off in a boat somewhere near the east shore of James bay and proceeded northward. Afterwards they landed, probably at the place called Ponga, and proceeded to help themselves to the provisions they found in the caches of the Eskimos, who thereupon attached and killed several of them. The survivors ran away, boarded their ship and sailed through the strait and across the Atlantic to the coast of Ireland.

Dr. Bell said he thought an exploration was necessary in order to get a reliable chart of that route and for the purpose of correcting existing charts. There was some correspondence about that matter more than twenty years ago. The imperial government did not think it important enough to justify the expenditure. They replied that they had only a few ships for such purposes, and that those ships were then employed on the coast of China, &c., getting information which was very important to British trade. They said the trade through Hudson strait was then of such comparatively little importance that they would not be justified in making a survey at that time. It would not be difficult to equip one of the Dominion's own ships for the purpose. While it is not immediately necessary, it should be done in the interest of navigation

sooner or later, but the shores are so bold and well defined that you could navigate the strait without any further charts than we possess.

There was fog one October day when the witness was going out on the *Ocean Nymph,* and great numbers of ptarmigan lit on the rigging of the ship in consequence of the fog. That is the only fog he remembered seeing in the strait. Once or twice the witness had experienced a little flurry of snow there. In some of the reports, they always speak of blinding snowstorms, but the witness had met nothing of the kind.

Speaking of the surveys, witness explained that he had himself surveyed the part of the coast from the neighbourhhood of Icy cape west of Charkbok, but that was a topographical survey. It was not for a chart. The whole of this coast is bordered by such a wide archipelago of islands, that you could not easily define it. Mr. Low made a survey from Douglas Harbour, eastward on the south shore to the bottom of Ungava bay, so these two surveys would be of some assistance in making a general chart. If the rest of the shores were surveyed as well as they did these parts, it would not be a bad map.

The ordinary ocean-going vessels would be suitable for navigating Hudson bay and strait, but in the winter time it might be all the better if the ships were protected.

SEASON OF NAVIGATION.

Dr. Bell, replying to a question by the Hon. Mr. Tessier, said it is hard to say how many months of the year steamers could pass through the strait. He did not see why they could not pass through at any time in the winter, thought it would be inconvenient. Neither the bay nor the strait are frozen up any more than the Atlantic ocean. He could not conceive a bay 600 miles wide, in the same latitudes as the British islands, being frozen with the meteorological conditions being normal for their latitudes. He might be told that it is the influence of the gulf stream that keeps the navigation open in the same latitude on the coast of Europe, but his informant would not know himself how the gulf stream works. Here you have no Arctic current such as you have along the Labrador coast, nor have you the advantage of the gulf stream; you have just the normal conditions for their latitudes.

Asked by the Hon. Mr. Watson as to the maximum and minimum temperatures in the strait, witness replied that in summer they had occasional frost at night; showing that the mercury must have fallen to about 30° or lower. They would find in the morning a little skim of ice around the yacht, but on going up among the hills during the day, the heat would be intense. The sun rises at half-past two or three in the morning and shines until ten o'clock at night in summer. He did not remember being ashore in October, but he penetrated inland earlier in the season. He had been in to the big Lake Amadjuak, north of the strait. That lake and Nettilling lake, both in Baffinland, are comparable to Lake Ontario.

The temperature of Hudson bay is about the same as that of Lake Superior. Lake Superior is cold, and early in summer it is foggy on account of the hot sun and the cold water. If you were out on a promontory you would find the water of the lake cold in the middle of summer, while in a sheltered bay you might find it warm enough to plunge in and have a bath. Dr. Bell said he had bathed in the water in Baffinland, and found it very pleasant, but it was only a few acres of water fed by a small stream running over boulders which were heated up by the sunshine, and so made the temperature of the water pleasant. In one of his reports, in 1877, he had a table showing the temperatures of the air, the sea and the rivers up the east main coast. That table was accurately prepared at the time as the results of observations, and he would prepare a copy of it for the committee.

The sailing vessels that had been passing through the strait would all be in the neighbourhood of 300 tons. They were not always specially constructed for that ser-

vice, but of late years a steamer, the *Eric,* takes the place of sailing ships. Old sailing vessels could scarcely hold their own in a head wind, and if there were scattered ice in the strait, they could hardly get through at all, and then it would be reported that they were stopped by the ice.

There is an ice cap many miles long called Grinell Glacier, the southern part of Baffinland. Baffinland is an island a little over 1,000 miles long, and part of it is some 500 miles wide. There is a good deal of glacier ice among the high hills in its north-eastern parts. There is only one place where Grinnell Glacier flows into the sea, and the little icebergs that break off there are carried into the current along the north shore of the strait.

CHURCHILL HARBOUR.

Asked by the chairman (the Honourable Mr. Davis) for information regarding the harbour of Churchill, Dr. Bell explained that Churchill river is the only stream on the western side of Hudson bay which enters the sea through solid rock, and has a fixed depth of water. He thought 12 fathoms was about the depth at the entrance. Then, when you get inside, there is good shelter with water shoaling to 8, 7, 6 and 5 fathoms at low water, with sufficient space to anchor a considerable number of ships. The entrance is like a slightly bent arm surrounding a point, and the moment that you turn the angle you are in perfect shelter. The entrance is regarded as quite safe. It is about half a mile wide. There is a lagoon at Churchill which fills up as the tide flows in. It is about eight miles long by over one mile wide, and all that water has to pass out of a narrow gap, is that when the tide goes out there is a rushing current from the lagoon. The spring tide is about 18 feet.

Dr. Bell explained that he piloted the first steamship that ever entered the harbour. Before that time he had been out and in with Hudson bay ships, and also often with canoes and sailing boats, and had sketched the place and knew there was no danger. He was the only man on the steamship who had ever been there before. As the vessel approached the harbour the sea was rushing out, and there was a tremendous foam. The captain hesitated to enter and steamed forward very slowly until he reached this place, when he became very nervous about entering. Dr. Bell told him he might throw him into the sea if he touched bottom anywhere along the course he directed. The captain kept a man sounding the depth, but the lead never touched bottom at all. The rushing tide, going out, carried away the lead long before it could reach the bottom. As soon as the steamship passed through the narrow entrance, there was very little current.

The harbour is large and fairly deep. From the time you turn the corner and get into complete shelter there is a space of half a mile to a mile in length where you can lay your ship almost against the shore, and there is deep water for perhaps a third of a mile out from the shore.

Dr. Bell explained that he had also gone to Churchill from inland. He had been in different years along the whole course of the Nelson, through the country north of Lake Winnipeg, down the canoe route ordinarily travelled to Hudson bay, and which takes in Pike river, Trout river, Hill river, Steel river and Hayes river. He was for a long time very anxious to get across from the Nelson to the Churchill, but for years everybody said it was impossible, but at last by inquiry from Mr. Roderick Ross, the Hudson Bay Company's officer at Norway House, he heard of an Indian who knew of a route. The witness crossed and surveyed it, and having mapped it out, it has been used a good deal ever since. Dr. Bell went first down the Little Churchill and afterwards the Big Churchill. No white man had ever gone down the river in the present generation, and it astonished them very much at Fort Churchill. He had two small canoes and four Indians. He camped at New Fort Churchill and proceeded to explore the country around, and find out about the rocks.

With regard to harbours on James bay, Dr. Bell stated that there are plenty of harbours on the east side from Rupert's bay northward. The water is a good deal lower than it was in Hudson's time. There might have been a harbour at the mouth of the Nottaway river at that date. Henry Hudson came there in a small ship, and the water was deeper then. Geologists speak of the land rising, but in the present case it might be correct to say that the sea is falling. The sea does not usually subside, but the general subsidence of the water in the north polar regions is from a different cause altogether. The ice cap which forms during some small geological period, say two or three hundred thousand years, changes from one pole to the other, owing to the movement of the earth, the procession of the equinoxes, &c. The south polar continent is covered with an ice-cap, probably two miles thick; and this will add a great weight—counterpoise which might change the centre of gravity of the whole earth, say 500 feet. This would lower the sea, say 3,000 feet at the north pole. Witness had no doubt the centre of gravity of the whole earth may have been moved 500 feet to the south, and this would draw the sea in that direction, leaving some of the northern region partly dry. It is like a large portion of the earth rising out of the water, but it may really be the sea that has retired and left the northern regions dry, or the waters shallower. At any rate the water in Hudson bay is receding.

The Hon. Mr. Power remarked that on the Atlantic coast of Nova Scotia and on the coast of New England the sea is gaining on the land comparatively fast, and asked if that was not rather inconsistent with the theory expounded by the witness.

The latter replied, 'Yes, if the general facts are true.' He went on to say he did not know as to that. The two cases in Nova Scotia given by Sir William Dawson had been shown not to be due to the general subsidence of the land, but to a sliding in of the land at these points. The nature of the earth in the background is such that it pushes that which is next to the sea into the water, submerging stumps, and giving the appearance of subsidence.

THE SHALLOWS OF JAMES BAY.

Dr. Bell said he did not know of any good harbour at the head of James bay, say 40 miles on either side of the boundary between Ontario and Quebec. There is an archipelago of islands from Sherrick's mount, north of Rupert's House, for a long way up the coast, and behind these islands there seem to be numerous places. He could not say off hand if there is a place for a harbour at the Nottaway river. At Moose Factory you have to go nine or ten miles out to sea to get water deep enough to float a ship. On the other side of James bay it is still worse. In Rupert's bay there are channels like ditches cut through the level mud. The Hudson Bay Company sends out men to drive stakes for beacons there, and they put brushy tops on them. They can do this work by walking on the mud with long boots. There is a narrow channel containing the river, say 10 feet deep at low tide, passing out. There is such a channel running out from the mouth of the Nottaway river northwestward, and it is joined at right angles by a similar channel from the Rupert river; but the Nottaway is an immense stream, twice as large as the Ottawa. Those channels meet and they pass by Stag Rock out to Stag island before they get deep enough.

James bay has a sufficient depth of water for safe navigation out in the middle; but there is a great breadth of shallow water along the west side. At low tide you could not pass anything there. There is an island on that side called Akimiski, which means 'slippery clay,' and between this island and the shore the bottom is level and covered with boulders, and that condition continues all the way down. He had tried to pass through there in a canoe and had been left dry at low tide. There is mud all around the head of the bay till you get north of Sherrick's mount on the east side. The first time the witness crossed James bay was in 1875. He was sailing across the bay from Moose Factory to Ministickwatin, and was almost out of sight of the low land. He asked the Indians how deep the muddy water was, and one of them said, 'I will soon

tell you.' He took out an oar, and plunging it down, found about four or five feet of water. The land is exceedingly low and covered for miles with grass next high water mark, then bsuhes, and finally with small trees. You have to go a long distance inland before you get tall trees. The tide in James bay is less than at Churchill and York, but no two tides are alike. If the wind is blowing from the north it may rise 15 or 20 feet, but if it is blowing from the south it does not rise more than 7 or 8 feet.

THE PROPOSED RAILWAY ROUTE.

At the request of the chairman, Dr. Bell proceeded to give some information regarding the country between Churchill and the north end of Lake Winnipeg, and to express an opinion as to the practicability of building a railroad through there.

Leaving Warren's Landing at the outlet, there is good land with points of rock near the rivers, along both the Nelson and the canoe route by Hayes river, but it may not extend everywhere inland. Of course these streams follow the greatest depressions, and the fine clay soil close to the river may have been deposited there, because it follows the deepest depression. He explained that he went down to York Factory in 1878, 1879 and 1880. He once took the route from Churchill to the Nelson which Mr. Tyrrell traversed. He went down the Little Churchill to its junction with the main Churchill, which he followed to its mouth. The route surveyed by the engineer who worked for a Montreal company some thirty years ago, followed Deer river in approaching Churchill harbour. This was George Baynes, of Charlottetown, P.E.I. He cut out a line from the foot of the navigable water north of Playgreen lake. There is navigable water there and he commenced to survey from the north end of it. That carries navigation probably forty or fifty miles below Lake Winnipeg.

In traversing that country, Dr. Bell explained, he explored to ascertain the agricultural value of the tract lying mainly to the west of that route, to the south of Split lake. West of the Nelson valley, there is a pretty good country. He had not been over much of it. He had been up and down the Grass river in that region. There is a post of the Hudson Bay Company called Nelson River House. It is really on Churchill waters at Three Point lake, and the country beween this and the Nelson river, Dr. Bell believes, is pretty good. On the route he followed from Nelson river to Churchill river the land consists of a hard clay surface. A good deal of the country is burned, and you can see the clay land. The rise from Split lake to the head of Little Churchill river is very considerable. The main Churchill flows at a general elevation of probably 500 feet above the Nelson river, but after you get down the main Churchill to a point about 50 or 100 miles from the sea, you can see nothing on either side excepting muskeg. A streak of bushes follows the river. Beyond that you cannot see anything, and long before you come to Hudson bay you can see Fort Prince of Wales looming on the horizon.

Asked for a definition of the word muskeg, Dr. Bell explained that muskeg is the same class of country you find up on Lake Superior. The word is just the Cree or Ojibway name universally used for what would be called wet barrens in Nova Scotia. It would be from half a dozen feet, upward, in depth. Many travellers have noted the clay banks along the Hayes river all the way down to York Factory, and they have declared the soil was frozen to a depth of fifty feet or more, and near the mouth of the Nelson river it would be over 100 feet. It shells off in summer in great slabs, ten feet thick, and leaves a hard surface as hard as ice. Dr. Bell, however, stated that he had shown that the frost in such places did not pass down from the surface, but horizontally. Towards the top, there is a solid three-cornered prism of frozen ground, owing to the frost penetrating it from the top, and also from the side. He once had some time to spare at York Factory and went out with all the men he could get and tested the matter. He found it was not frozen permanently to any great depth. He

would get a heavy stick of tamarac or black spruce and point it very sharply and get a number of men to work it down to a considerable depth through the muskeg. Sometimes he would find, where there was moss on top of the muskeg, some ice immediately below it, but in a general way the ground is not deeply frozen. The water drips out from the muskeg on top of high banks all winter and the little streams run all winter. The bottom is not frozen, and the brooks must have this water supply during winter.

The muskeg extends up the Churchill river for fifty miles or more.

Witness said that he did not know if there is a good route along the river to Churchill, where the muskeg can be avoided. Probably by going far enough east or west a route could be obtained. He doubted if a railway could follow the bank of the river, but he did not think there would be any such difficulty in building a railway down to a point 50 miles from the bay. The only difficulty might be in building the 50 miles nearest to the bay. The best way might be to keep to the east side. The harbour is on the east side, and on the west side it is shallow. Just at the mouth of the Churchill river the land is all dry. He had walked along many miles to the east and west. He had been, say ten miles west, and ten east. From Churchill harbour or from 'the New Fort,' which is five miles up, in going straight west, it is dry all round Button's bay, and everywhere thereabouts, and to the east of the river there is a dry streak at least ten miles along the coast.

Dr. Bell said he expects the bed of the muskeg is just a lateral extension of the immediate valley of the river.

HUDSON BAY TEMPERATURES.

In accordance with the request of the committee, Dr. Bell subsequently forwarded to the chairman, who submitted it to the committee, an extract of his report published in the report of the Geological Survey of Canada for 1877-8 (page 26c) as follows:—

The following table gives the result of the above observations and also the temperature of the air at the different times at which they were made. The Fahrenheit thermometer was used, and whenever the sea happened to be calm the instrument was lowered to a depth of three or four feet below the surface:—

TEMPERATURE of the Sea, Rivers and Air along the Eastmain Coast in 1877.

—	Date.	Hour.	River.	Sea.	Air in Shade.
1. Rupert's River at Rupert's House	July 11	10.00 A.M.	61°		48°
2. Eastman River, two miles up	" 15	9.30 "	59°		66°
3. Middle of great bay south of Cape Hope	" 15	2.00 P.M.		59°	72°
4. Twenty-five miles north of Cape Hope	" 16	12.30 "		47°	65°
5. Eight miles south of Big River	" 17	5.00 "		47°	57°
6. Mouth of Big River	" 17	7.00 "	63°		63°
7. Twenty miles north of Big River	" 18	4.00 "		57°	62°
8. Wind-bound Point, thirty-five miles north of Big River	" 19	2.00 "		53°	70°
9. Ten miles E.N.E. of Cape Jones	" 24	4.00 "		45°	58°
10. Thirty-six miles northeastward of Cape Jones	" 25	7.00 "		52°	73°
11. Fifty-three miles north-eastward of Cape Jones	" 26	12.30 "		48°	82°
12. Black Whale Harbour	" 26	9.00 "		53°	
13. Great Whale River opposite H. B. Co.'s Post	" 28	1.00 "	68°		82°
14. Do. after two cold windy days	" 30	9.00 "	59°		48°
15. Open Sea, forty miles N. of Great Whale River	Aug. 1	6.00 A.M.		53°	70°
16. 'Second' River at fifty-one miles north of Great Whale River	" 2	9.00 "	63°		
17. Off do.	" 2	9.15 "		52°	
18. South side Richmond Gulf	" 9	11.30 "		61°	68°
19. South point Cairn Mountain Island, Richmond Gulf	" 9	3.00 "		62°	72°
20. Opposite Last or Northern Nastapoka Island	" 16	3.00 "		50°	55°
21. Land-locked Harbour	" 17	11.30 A.M.		55°	66°
22. Southeast of Last Nastapoka Island	" 25	12.30 P.M.		53°	65°
23. Middle of Nastapoka Sd. between N. River and Salmon Fishery Cove	" 26	2.00 "		53°	70°
24. Midway between Inlet of Richmond Gulf and Belanger's Island	" 27	6.00 "		57°	65°
25. Open Sea between Great Whale River and Manitounuck Sound	Sept. 1	11.00 A.M.		52°	53°
26. Great Whale River, opposite H. B. Co.'s Post	" 2	2.00 P.M.	54°		59°
27. Off Esquimaux Harbour	" 3	1.30 "		53°	56°
28. Dead Dog Cove, after three days' blow	" 6	3.00 "		51°	58°
29. Mouth of Big River, Fort George	" 18	7.00 A.M.	59°		51°
30. Kumishoo's Bay, forty miles south of Fort George	" 19	7.00 "		50°	49°
31. Off South Point of Rupert's Bay	" 21	7.00 "		55°	50°
		Of five rivers.			
Average			61°	53°	62½°

EVIDENCE OF COMMANDER WILLIAM WAKEHAM, OF THE CANADIAN FISHERIES PROTECTION SERVICE, GIVEN BEFORE THE SELECT COMMITTEE, APRIL 5, 1907.

Commander Wakeham explained that he was in 1897 commissioned by the Dominion government, Sir Louis Davies being then Minister of Marine and Fisheries, to proceed to Hudson bay. His instructions were to go into the straits as early as he could and force his way into Hudson bay, to make a number of trips backwards and forwards during the season, and to remain there as late as he could during the fall, with safety.

The department chartered the sealing vessel *Diana* from Messrs. Jobs, of Newfoundland, for the purpose of the trip. It had been the intention of the witness, and the minister's intention, that the expedition should get away about May 20, but the *Diana* got stuck in the ice at the seal fisheries, and did not turn up in time to let them off that early, and it was June 3 before she left Halifax.

From Halifax they went out through the straits of Belle-Isle, and there the *Diana* got stuck in the ice, and it was June 22 before she got off the mouth of Hudson strait. At two or three points they tried to get in to the mainland, to ge an interpreter to interpret with the Esquimaux, but they could never get through the pack, and arrived off the mouth of Hudson strait, about sixty miles off, without having succeeded. They kept along the edge of the pack all the way, and got there as the tail end of the pack coming from Baffin's bay and Smith's sound, and the ice that comes from Greenland, passed down. On June 22, they were able to steam sixty miles into the strait through loose open ice that almost any vessel could have gone through, but not as rapidly as the *Diana* did, perhaps because she drove right at it. Almost any vessel could have got through.

Inside the strait they found open water, and thought they were going to have no difficulty in getting through. Everything looked clear ahead, until they came up in the neighbourhood of the Saddle islands, and met with a barrier of solid, heavy ice. They turned round and followed it, looking for an opening, and followed it all the way across the straits. The witness had not had a great deal of experience with ice of that kind, but any one could see that there was no use attempting to go into a pack of that solidity.

However, he had with him a gentleman representing the interests of Manitoba and the Northwest, Mr. Fisher, of Winnipeg, and he was anxious that something should be done. The witness posted backwards and forwards across the front of the barricade looking for an opening, and did not find any. It was drift ice that had been blown there, probably by an east wind. It was a regular wall. Mr. Fisher became impatient and thought the witness ought to do something towards forcing his way into it. Eventually witness said, 'Well, all right, here goes,' looked for a soft spot, and forced the ship in.

As a result, the *Diana* was jammed from June 23 until about July 9 or 10. They were badly jammed, and the ship nipped, and all hands got ready to leave her on two or three occasions. That was on July 9 and 10. They had worse jams on July 4. However, the wind changed and the ice began to go abroad, and they got out of it by steaming to the southward.

Commander Wakeham explained that if he were to go there again, he would not attempt, no matter who urged him, to go into a pack of that kind. He thought he lost time by doing it. If he had remained off the large pack, cruising about until it went

abroad, or he found an opening in it, he could have got in on the other side of the straits a few days earlier than he did. He got out of the pack by steaming to the southward, and had no difficulty after that in getting into Hudson bay.

He got into Hudson bay on July 12, going down between Mansfield island and Coates island. He steamed round, and saw no ice of any consequence, and put about to go out again.

Commander Wakeham had with him Mr. Low, the present director of the Geological Survey, and Dr. Bell. They had parties of men with them, and two yachts. He landed Dr. Bell on the north side of the strait, and Mr. Low on the south side, and they spent part of the summer months in cruising along the shores. The witness picked them up and brought them back in the fall.

The witness steamed up in the direction of King's cape, hoping to land Dr. Bell there, but could not get there on account of the heavy ice coming out of Fox channel. The ship got jammed in that for part of the day, but they managed to get her out, landed Mr. Low, and went across the strait, finding only loose, open ice. The witness landed Dr. Bell on the other side, and as soon as he landed him, he came out again and ran out to sea.

As soon as he got out there he met no ice. The *Diana* went fairly well out into the Atlantic, far enough to see there was no ice in sight, and on July 22 put about, and sailed back again into the strait, but met no serious ice.

SUMMER TRIPS TO THE BAY.

The witness slowed up occasionally in the ice, but got back. He stopped also to look for a harbour. Of course, the whole of this coast is unsurveyed and not actually charted. There is no proper hydrographic survey, and very little was known about harbours. He wished to find some place he could put in, in case of trouble, and he looked about and found a place they called Douglas Harbour, where they could rendezvous. He remained there a day or two getting fresh water.

He left on the 21st, and was back in Hudson bay on the 24th. That was the first time he was able to pass through without difficulty. That was the second trip going in. On the first trip he had to land Dr. Bell and Mr. Low, and was delayed by that. On this second trip, he was again in Ungava bay on July 22. He made the round trip in six days. From the Atlantic ocean to the point in Hudson bay where he turned round would be very nearly 700 miles. He went down into the bay, and come out again, making the round trip in a little more than six days altogether, nearly 1,400 miles. Under sail and steam the *Diana* would run nine or ten knots an hour.

There was no delay from ice except during the first trip. After Commander Wakeham landed Dr. Bell on the first time out, the wind was blowing from the westward. He hoisted canvas and started out, and set his log the same as he would anywhere else. After he came out on the second trip, he came back to look for a certain island. The former charts had always shown an island called Green island, and one part of the instructions of witness was to see whether that island existed or not. It was not there. It does not exist, but an island which is now on the maps had been wrongly placed on the old map; there is only one island where there was supposed to be two.

The witness went back after that to Natchvack, the Hudson bay post, where he had agreed to meet a vessel which had been sent up with fuel for the *Diana,* and after that he went up in Cumberland gulf. On the second trip he got back to Natchvack on August 1. The *Diana* was delayed waiting for the other vessel, and she did not arrive for several days after the expedition got there.

The *Diana* left again on August 13, arrived in Cumberland Gulf on the 15th. and left there again on August 19 for Churchill. She then went back again through the strait. Witness explained that he met with no trouble from ice at all on that

trip, but it had always been supposed—and it is the case—that any difficulty with ice occurring during the summer or fall is caused by the ice coming out of Fox channel. The ice comes down there, on ordinary occasions, in calm weather, in a stream around King's Point, and sets off down through the strait. The days are long in the summer and the sun is warm, and Commander Wakeham remarked that he thought very little of that ice ever goes out into the Atlantic. It is very heavy ice up there, and in the warm summer days, by the time it gets down to Hope's Advance, it generally disappears.

He had no difficulty in getting through this time. The only ice he saw was the ice he looked for off Fox channel.

At this point the witness interjected the explanation that it had been suggested that he take a tramp steamer for this trip. It had also been suggested that the *Stanley* would do, but the captain of the *Stanley* and the witness thought she would not do for the purpose. They were ordered to go in and force their way through as early as they could, and a tramp steamer could not have done that. You must have a vessel prepared for such work. That was the first trip, but on the second trip, the witness repeated, he met no ice that would bother any vessel. An ordinary tramp steamer, however, would have to avoid the ice more than he did.

Proceeding with his narrative, witness explained that he spent some time looking at the ice in Fox channel. He could have gone up into Fox channel, but the ice was too thick, and he came down south and put into Churchill.

He had fine weather across the bay—strong wind and no ice whatever. He got to Churchill on August 29, and remained there until September 2. He left on September 2, stayed out in the bay, and spent some time looking for fish. He set trawls and tried for fish and got nothing. He had promised Dr. Bell that he would meet him at a certain date and take him off, and he had to be there, so that he could not stay as long in the bay fishing as he would have wished.

He went back south of Mansfield island this time, and on September 7 was off Cape Digges. They experienced their first snowstorm on that date. From that time on they had snow almost daily in the straits, not heavy snowstorms, but snow squalls.

The *Diana* picked up Dr. Bell and took him across to Fort Chimo. Mr. Low had agreed to meet the ship at Fort Chimo, and Commander Wakeham took both of them on board and took them to St. John's, Newfoundland. The *Diana* was at Fort Chimo on September 16 and left on the 19th. She was not interfered with by ice on the way out.

AUTUMN NAVIGATION.

The witness remained in St. Johns refitting until October 6, and on that date left to go back to the straits. He got back off the mouth of the straits on October 15, and was delayed there by snowstorms. He got back to Douglas Harbour on October 18. On the 24th he was again at Cape Wolstenholme. That is at the entrance of the bay, and met no ice. He then went back to Douglas Harbour and held on there for a while, intending to go back into the bay again. He made his last attempt to get into the bay on October 29, and was stopped by heavy winds and snowstorms, the ship icing up very much. He tried to force his way, but decided that, all things considered, it was not safe to stay there any longer, and put about.

There was no ice. It was simply the weather, the snowstorms, the short days and the long nights. It was not light until eight o'clock in the morning. The character of the coast, not being charted, was somewhat of a difficulty, and the fact that the land was bold and abrupt and covered with snow also caused trouble. You could not tell how far from it you were. It was cold, freezing up. The information as to the temperature was given in tables and sent to Mr. Stupart. It was freezing enough to ice

the ship. She was iced up so much that it became difficult to get around with her, and if she had iced up much more, they might not have been able to get about with her.

The object of the expedition was to ascertain if there was not an earlier period of opening of navigation and a later period of closing than Captain Gordon suggested. There was no doubt about the centre months of the summer. The idea was to get in earlier, and remain later than Captain Gordon, and they did get in earlier. Wakeham said he thought if he had not yielded to Mr. Fisher, and had taken his own way, he would have got in a day or two earlier. He made four round trips altogether, two of them going into Hudson bay, and one of them into Churchill. He also went north into Cumberland Gulf.

The *Diana* got to the bay ahead of the trading ships. They did not go until some time in August, and they went out long before the expedition did. They go out in September. When the *Diana* went to Fort Chimo to pick up Mr. Low, they found the Hudson bay ship had left. They only make one trip. They come down to Churchill and lay off at York. At that time the company had a sailing vessel. Now they have a steamer to serve James bay.

The harbour at Churchill is a good harbour, easy of approach and safe. It is not a very large harbour. Captain Gordon surveyed it, and his report on it is very definite and distinct. There is a strong current running through it. The witness saw no ice in it, and saw no ice in Hudson bay. He did not think the ice in Hudson bay will count for very much. The ice there drifts from shore to shore. With an easterly wind it is on the west side, and with a westerly wind it is on the east side. He does not think much of the ice of Hudson bay ever goes out through Hudson strait at all. The ice that gives trouble in Hudson strait is the ice from Fox's channel and the Baffin's bay ice that is blown in there.

THE CLOSE OF NAVIGATION.

There is no doubt, when the strait is properly surveyed and lit, it will render navigation safe, but the climatic conditions are such that you cannot expect navigation there after the end of October. That is on account of the hazardous weather, and that cannot be overcome by lights. There are snowstorms and freezing up to contend with. There is nothing a captain dreads more than a snowstorm at sea. It is worse than a fog. With a fog you generally have calm weather, but with a snowstorm you have a sea and wind. There is considerable tide at Churchill, but not nearly as much as there is in the centre of the strait.

Commander Wakeham said he did not think the Hudson Bay Company sailing vessels are bothered now with ice, and in the olden days the ice that troubled them came from Ross Welcome. It came down along the west shore of the bay and got jammed there.

In Hudson strait the tide is very rapid and strong, and off the mouth of the bay the tide ripp is very heavy. Off the Welcome the ice bothered the sailing vessels in July, the witness understood, but he saw nothing of it. But the agent who was at Churchill, Capt. Haws, who was drowned at Winnipeg the other day, sailed vessels there a good many years, and the witness got a great deal of information about it from him. The navigation will be improved if there are lights in the strait, and if the strait is properly surveyed. It will be a great assistance to vessels if they establish the wireless telegraphy, so that they could get information about the condition of the straits with regard to ice. Of course they have snowstorms down around Halifax and other places.

There is plenty of sea room in Hudson strait, and the shores are fairly bold. There are a few islands close along the south shore. The northern shore is not so good. There are reefs extending out, and one or two places isolated rocks. Apart from the ice the witness considers it an ideal inlet.

He did not give the fishing a fair test, but the captains of the Hudson bay vessels, which have often been beeome becalmed in the old days, have often tried to eateh fish, and they never caught any.

One thing you remark in Hudson bay is the absence of life—birds, whales, and so on—and it is hard to say the reason. Mr. Low found rock eod along the shore. Witness did not think there is any great volume of fish in Hudson bay. The Newfoundland fishermen go up to Cape Chidley and to Resolution island, and they find eod there, but they never get any fish in Ungava bay.

With regard to the compass deviations, there is sometimes a great deal of trouble. In this district you are near the magnetic pole. The witness had no serious diffieulty, having a properly eompensated Thompson compass. He could not trust absolutely to it, but had no difficulty.

EVIDENCE OF R. F. STUPART, DIRECTOR OF THE DOMINION METEOROLOGICAL SERVICE OF CANADA, GIVEN BEFORE THE SELECT COMMITTEE, APRIL 5, 1907; TOGETHER WITH A SHORT REPORT REGARDING THE CLIMATE OF NORTHERN CANADA, AND SOME TABLES OF TEMPERATURE AND PRECIPITATION, PREPARED SUBSEQUENTLY BY HIM FOR THE COMMITTEE, AND LAID BEFORE THAT BODY BY THE CHAIRMAN.

Mr. Stupart, in his evidence before the committee, explained that the service under his charge has records from a large number of stations in Saskatchewan and Alberta, and from a few stations scattered over the Mackenzie river basin, and along the shores of Hudson bay. For instance, along the shores of Hudson bay there are observations taken at Moose Factory, Fort Churchill and York Factory; and moving inland, at Fort Hope on the Martin river. From a number of stations in Alberta and Saskatchewan reports are received twice a day, namely, from Edmonton, Calgary, Medicine Hat and other places. North of the telegraph, the reports are altogether dependent upon the mails, and arrive from two months to six months or a year after the observations are taken. The observations are taken regularly by paid observers—men who are paid either $50 or $100 a year for doing the observation work. Many of them are missionaries; others are employees of the Hudson Bay Company. They are supplied with government instruments by the department. Observations are taken in the far north at Herschell island, Port Simpson, Pale river—that is Fort McPherson—Fort Good Hope further up, and further south from Fort Chipewyan and Fort Dunvegan and Fort Vermilion. This year instruments have been supplied to Lesser Slave lake, Peace River Landing and Fort Vermilion. These are three new stations opened up in the Peace river district.

Mr. Stupart explained that he had been in charge of the service since 1894. The bureau was organized in 1870. The observations in very few instances go back to 1870. In the provinces of Ontario and Quebec and the maritime provinces, they go back to 1870, or in some few instances at the Grammar Schools to 1868. The witness did not think any of the observations in the northern countries go back beyond 1883, except at Churchill and York, where observations were taken by the Hudson bay factors, and the department has possession of their reports. There are only a few years' observations in Ungava. There is a record for three or four years at Fort Chimo, and then for 1884-5-6, and again for a portion of 1897 there are reports along the shores of Hudson strait. Those are observations taken six times a day. It is a very perfect report. The information contained in Andrew Gordon's report was the work of the Meteorological Service. There is no automatically registered sunshine. The Meteorological Service take the rainfall, the snowfall, the height of the barometer, the temperature of the wet and dry bulb barometers, the clouds, the directions in which they are moving, the fogs, and the direction and force of the wind, the rainfall and snowfall. These are all set forth in the tabulated statements.

LACK OF DATA ON PEACE RIVER CLIMATE.

Mr. Stupart explained that, taking the records as a guide, he was rather at a disadvantage in reporting as to the climate of Peace river, inasmuch as up to last year the department had only one station in the Peace river country, and that was at Dunvegan. The station there is down in the valley, and from reports that he had since received from a surveyor who had been working there for the last two or three years, it

would appear that on the high lands above the river the climate is somewhat different from what it is at Fort Dunvegan, which is situated on the river bank. But the general knowledge of the country possessed by the witness would lead him to suppose that taking the three summer months, from the first of June to the end of September, the isothermal line of fifty-seven and one-half degrees, which he considers is about the lowest which is the boundary of what might be considered absolutely successful agriculture, would extend from almost the foot of the Rocky mountains, run almost north, following the mountains, and extend certainly beyond Lake Athabaska, down half way across Lake Athabaska, thence north of Lake Manitoba. There is not sufficient knowledge of the southern part of Keewatin to trace that line 57·5 further, but it probably continues to a point south of James bay. In other words, this particular isothermal line would run from a point further south than James bay in a northwesterly direction, passing west of Slave lake to a point northwest of that. As you go northwesterly you are getting further and further away from Hudson bay. The witness questioned very much whether the country lying between Great Slave lake and Hudson bay is a country in which agriculture would be thoroughly successful. He did not, however, mean to say that there might not be at times good seasons.

Mr. Stupart explained that the practice is to draw the isothermal lines every five degrees, and he considered 55 too low a temperature for assuredly successful agriculture. A temperature of 57·5 degrees, provided that remains for two months, is perfectly safe for agriculture. Without doubt the summer temperature is what settles the question of vegetation altogether. He was not prepared to say there might not be some kind of mixed farming carried on in the district north of the isothermal line 57·5, but he would be rather inclined to doubt whether you could depend on ripening wheat, for instance. The ripening of wheat depends largely on the sunshine.

The witness explained that he did not want to be dogmatic on that 57·5 isothermal line, but from what study he had given to the subject that was his impression. He did not know for a fact that wheat would not grow beyond that line; that had not been demonstrated as yet.

In reply to a question, the witness stated that the summer temperature of 57·5 would be about that of England.

Manitoba and the southern parts of Saskatchewan and Alberta are, if anything, warmer in the summer than England.

The temperature at Dawson, in the Yukon, occasionally, in some seasons, rises above 90 degrees, and a summer never goes by without the temperature for many days going considerably above 80. The length of the day is a very important factor. The length of the day makes up for the loss of the sun's intensity; so that putting the two together, the climate in the northwest for the purposes of vegetation is as good as in the south of England. Occasionally they record frost in June in England, but the witness had his doubts as to whether it was ever recorded as early as the end of August. The temperature of the two countries is absolutely different. While the summer temperature over all the southern parts of our western provinces is comparable with England, and perhaps the north and western coasts of France, after about August 20, the downward trend of the temperature curve in Canada is very rapid, whereas in Great Britain and France it is very slow. Of course as one goes north in Alberta and Saskatchewan, the downward trend of this temperature curve becomes very rapid indeed.

THE CLIMATE NEAR HUDSON BAY.

Asked by the Honourable Mr. Power as to the temperature at Fort Churchill, Mr. Stupart replied that Churchill is a cold place. The mean temperature of the month of May is only a trifle above the freezing point, namely, 32·5. June is 42·3, July 55·5, August 52·6, September 42·3, and October is winter, namely, 27.

He had also a record of the lowest temperature in each of those months. He was very sorry to say it was an imperfect statement, because he had not very much faith in

the observer there. There was a record of 12·6 in the beginning of May, 25·8 in June, and of 30 in the month of July.

In the winter months the temperature at Churchill falls lower than in the Mackenzie basin. The influence of the large body of water in Hudson bay makes the summer cooler and the winter milder. During the winter months the winds at Churchill are persistently from the west and northwest. It is exceedingly rare to have a wind off Hudson bay in the winter months. In the summer months for more than half the time the winds are off the bay and from the east and northeast.

As to the isothermal lines of that part of the country lying south and west of Split lake on the route of the proposed railway between the head of the Pas and Churchill, Mr. Stupart explained that in the month of June the district in question is between the isothermal line of 50 and 55. The corresponding isothermal district in Europe would be the extreme north of Scotland in June.

In July that district is between the isothermal lines 55 and 60, and that would correspond with Scotland and a portion of Scandinavia. In the month of August the district in question is about 55, and there you have Scotland again. That country had a reasonably fair climate for the three summer months, June, July and August. It would be suitable for oats, barley, potatoes and wheat.

Meterological observations are now taken at:—

	Latitude.	Longitude.
Athabaska Landing	54·43	113·17
Dawson	64· 4	139·20
Dunvegan	55·56	118·35
Edmonton	53·33	113·30
Fort Churchill	58·51	94·11
Fort Simpson	61·52	120·43
Fort Chipewyan	58·42	111·10
Fort Norman	64·57	125· 0
Herschel island	69·30	139·15
Hay river	60·51	115·20
Whitehorse	60·45	135· 0
York Factory	57· 0	92·28
Fort Hope	51·32	87·48
Norway House	53·58	97·52
Fort McPherson (Peel river)	67·27	134·57

Mr. Stupart informed the committee that the meteorological service have observations taken in 1884-5-6 and 1897, in Hudson strait. Mr. Stupart himself spent the season of 1884-5 there. He stayed at Cape Prince of Wales all winter and enjoyed the winter very much. The lowest temperature he had that winter was 38 below zero, but the average temperature was 23½. It was blowing a gale there for half a month. He and his party arrived there on August 16. They could have reached there the middle of October if they wanted to and could have left there about the first of the following August, roughly speaking; not earlier than that, that particular year. There was practically no ice for nearly three months, namely, in August, September, and the greater part of October, in fact all October, except that they might see ice out in the strait. They did see it there, probably coming from Fox channel. They had six observations a day, the observations being taken in daylight. One of their duties was to go to the top of the hill, three hundred feet high, at the back of their house, and observe the state of the ice in the strait with a powerful field glass, and they wrote down on each occasion what they saw.

Mr. Stupart explained that he does not think Hudson strait freezes solidly in winter, but it is blocked with ice in the early spring and late spring, and the ice is continually changing. He and his party used to see lots of water shifting out, and then the ice would close up again. A person could cross there for three months in the

year, but would be seriously handicapped at times. He would not say that a ship might not, by chance, pass almost any time of the year. The ice is very thick indeed, however, and rafts up. He had watched it and seen it rafting up. The harbour ice at Cape Prince of Wales froze to about 7½ feet.

Fogs are very frequent at Hudson strait.

With regard to the possibility of the navigation of Hudson bay, Mr. Stupart was not prepared to say that steamers cannot get through for a good deal longer period than three months. He did not consider himself an authority; he had not been through the strait.

April 22, Mr. Stupart forwarded to the chairman of the Select Committee a report on the climate of northern and western Canada, which he promised while under examination to prepare. This report was in due course laid before the committee, and read as follows:—

REPORT ON THE CLIMATE OF NORTHERN AND WESTERN CANADA.

A regular series of meteorological observations was begun in Winnipeg in 1872, but it was not until between 1883 and 1885 that eight stations with paid observers were opened at carefully selected points in the western provinces, Prince Albert and Edmonton being the most northerly stations of the reseau. Observations at these stations have been continued ever since and the climatic features of this country as indicated by them has been supplemented by observations of temperature, weather and rainfall by voluntary observers at numerous intermediate stations.

In Athabaska and the Mackenzie Basin, observations taken chiefly by missionaries and Hudson Bay Company's officers and extending over periods ranging from 5 to 15 years, afford valuable information regarding the climate of the unorganized territories.

On the shores of Hudson bay more or less reliable, but somewhat broken series of observations at Fort Churchill and York Factory covering a period of 30 years, are available, and at Moose Factory the meteorological record dates back to 1878.

A study of the accompanying tables containing the average mean temperature, average daily maximal and average daily minimal temperatures; also the absolutely highest and absolutely lowest temperatures of which the meteorological service has record, indicate beyond doubt that spring opens earlier in western and southern Alberta than it does to the east and north. In April the average daily highest temperature is 53°·2 at Calgary and 58°·5 at Medicine Hat, while corresponding values are 50°·6 at Winnipeg; 50°·2 at Prince Albert, and 39°·4 on the shores of Lake Athabaska. These figures indicate that the days are warm, and that April is truly a spring month in most years, but it should not be forgotten that night frosts are severe and frequent in April throughout the western provinces. To the northward and eastward of Manitoba the advance of spring is not so rapid, Norway House showing an average daily maximum of 42°·7 and a daily minimum of 21°·5; Fort Hope an average maximum of 43°·2 and minimum of 18°·7, while the figures for Moose Factory are 37°·7 and 17°.

Northward of Slave lake, in the basin of the Mackenzie, the retardation is still greater with an average night temperature of 13°:8, at the mouth of the Liard river, and zero or lower in the neighbourhood of the Arctic circle.

As May advances the upward trend of the temperature curve is more rapid in Manitoba and Saskatchewan than in Alberta, and the average temperature of May for the whole territory west of Winnipeg and south of Prince Albert, excepting north-eastern Saskatchewan is approximately the same, with a general mean of about 50°, and an average day temperature ranging between 65° at Winnipeg and 62°5 at Qu'-Appelle.

Northward from Prince Albert to Lake Athabaska and thence along the Mackenzie, the season in May does not advance so rapidly, Fort Chipewyan showing a monthly average of 44°·5, Hay river 41°·2, and Fort Simpson 43°. It is noteworthy that the

mean temperature for May at Dawson City is 45° ·5, very nearly the same as at Norway House.

Near the Hudson bay the season is still less advanced, with an average mean temperature of 32° ·5 at Churchill, 34° ·6 at York Factory and 41° ·6 at Moose Factory; this latter temperature being lower than that of either Dawson or Fort Chipewyan.

THE SUMMER MONTHS.

In June the mean temperature at Winnipeg is about the same as at Toronto, namely, 62°, which is from 5° to 7° higher than the average in Alberta, Calgary giving 55° ·3, Edmonton 57° ·1 and Fort Dunvegan 56° ·5. In this month also the mean temperature of the territory near the shores of Lake Athabaska and northward to Fort Simpson are but a shade lower than at Calgary. Moose Factory has an average mean of 55° ·2, and an average daily maximum of 66° ·6, a very little lower than Calgary and nearly the same as Fort Simpson. But further north at Churchill and York the average is still below 50°.

For the three summer months a vast area which includes western and northern Alberta, northern Saskatchewan and the basin of the Mackenzie, almost to the Arctic circle lies between the isothermal lines of 55° and 60°. Throughout this whole region the percentage of the possible amount of sunshine seems to approximate 55, and as the hours of possible sunshine at midsummer range from 17^h 0 in the latitude of Edmonton to 19^h 30^m at Fort Simpson, it may be surmised that growth of plants an cereals may be even more rapid in the northern than in the southern districts.

The average daily mean highest temperature in July at Winnipeg is 77° ·8, at Calgary 74° ·7. At Hay river on Great Slave lake, it is 73° ·5 and at Fort Simpson 71° ·4. Possibly the somewhat lower temperatrue in the north may be offset by a longer period of bright sunshine.

From the very meagre observations in the Peace river district, it is not possible at present to report definitely on the liability to late summer frost. Fort Dunvegan, the only station at which a regular record has been kept for several years, is situated in the valley, and the temperature there registered may possibly differ somewhat from that on the higher plateau, although comparison with observations made in survey camps leads to the conclusion that the summer frosts which are in some years recorded in the valley, also occur on the higher lands.

The whole question as to late summer frost in the western provinces is as yet tentative. In the eighties there were many winters of extreme severity, and again in the early nineties to a somewhat lesser degree, and it was during these same periods that summer frost was not infrequent. The winter just closing has been of almost unexampled severity, and it would be unwise at present to pronounce that there has been any chance in climate beyond that of a cylindrical nature.

While, as has been shown, the summers of the Mackenzie river do not differ greatly from the summers in Alberta and Saskatchewan, it should be borne in mind that as the latitude increases the more rapid is the downward trend of the temperature after about August 20. The mean for September near Lake Athabaska is fully 5° lower than at Edmonton, and near Slave lake 6° or 8° lower. The effect of high latitude is also evident in September in the Peace river districts, as the temperatures in this month no longer agree closely with those of Edmonton and Calgary. In October, frosts are severe and of almost daily occurrence in northern Alberta and Saskatchewan, while north of Lake Athabaska winter is setting in rapidly.

ABOUT WINTER TEMPERATURES.

The average winter temperature at Winnipeg is about 15° colder than at Calgary, and northward the cold increases even more rapidly, as is shown by the mean temperature for January which as shown by Table 1 is 7° above zero at Edmonton, 10° below at Fort Dunvegan and 17° below near Slave lake.

Perhaps the most remarkable feature of the winter in the western provinces is the variableness of corresponding seasons in different years, and this is peculiarly the case in Alberta where, as shown by meteorological records, the mean temperature in, say January, may be 15° below zero, or it may be about 25° above. Fortunately, however, such extremes do not occur in the summer months, which do not appear to vary from year to year more than in Ontario.

Temperatures of 80° and upwards are recorded occasionally in the month of May in all portions of the Canadian western and northern territory, except near the Arctic sea, and as the summer advances these high temperatures become of more frequent occurrence, and there are few localities where 90° is not occasionally recorded even as far north as the Arctic circle.

The summer mean temperature of Manitoba and southern and eastern Alberta and the greater part of Saskatchewan approximates very closely to that of the south of England, Belgium and the north of France, while in the territory lying to the northward between the isotherms of 55° and 60° the summer temperature may well be compared with that of the south of Scotland and southern Scandinavia.

Taking the month of July alone in this latter region, which includes the district between Lake Manitoba and Hudson bay, the mean temperature is very fairly comparable with that of the south of England.

From the meagre and somewhat unsatisfactory observations of rainfall and snowfall over the extreme northern portions of Alberta and Saskatchewan, and in the valley of the Mackenzie, it would appear that the total annual precipitation is very generally between 12 and 14 inches including the moisture from between 40 and 60 inches of snow. This amount may be ample for successful agriculture, as fully 50 per cent or more falls as rain between the beginning of May and the end of August.

Near Hudson bay the rainfall is somewhat greater.

Respectfully submitted.

R. F. STUPART.

TABLES ACCOMPANYING MR. STUPART'S REPORT.

TABLE I.—Showing the average mean temperature in the various months at stations in Northern and Western Canada.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Summer Mean.
Fort Macleod	20.3	18.5	25.1	42.6	50 6	57.3	64·5	62.8	53 0	42.5	28 7	27.3	61.5
Calgary	12.3	13.5	23.9	40.0	49 1	55.3	60 6	57.5	50.2	41.9	25.6	20.4	57.8
Edmonton	7.0	9.8	22 3	41.0	51.5	57.1	61.2	59.1	50.0	41.5	24.0	16.6	59.1
Medicine Hat	11.3	12.7	25.6	14.9	53.0	61.3	68.1	66.4	55.8	45.6	28.2	20.4	65.3
Prince Albert	— 4.1	— 2.1	12.3	37.1	49.3	57.5	61.8	59.0	49.0	38.1	17.6	5.0	39.4
Qu'Appelle	— 0.3	0.8	14.6	38.2	50.2	59.3	64.0	61.7	51.9	40.6	21.1	9.5	61.7
Winnipeg	— 3.8	— 1.5	14.9	38.9	51.7	62 0	65.8	62.7	53.7	40.9	21.0	5.4	63.5
Dunvegan	—10.2	4.4	10.0	38.2	50.5	56.5	61.3	57.4	46.3	33.1	18.6	— 1.6	58.4
Chipewyan	—12.0	— 6.8	5.1	28.5	44.5	54.0	61.5	58.2	45.2	33.7	11.1	2.2	57.9
Norway House	— 9.4	— 6.8	7.6	32.1	46.5	55.4	62.4	59.7	49.0	35.8	16 6	— 2.1	59.2
Fort Hope	— 6.6	— 4.8	7.7	31.0	44.2	54.4	61.3	59.1	48.4	36.5	19.2	— 0.6	58.3
Moose Factory	— 4.0	— 1.2	10.0	27.3	41.6	55.2	61.6	58.6	51.7	40.4	21.0	3.3	58.5
York Factory	—18.8	—14.0	— 0.2	21.5	34.6	48.0	55.7	53.4	43.7	28.4	10.5	—10 1	52.4
Fort Churchill	—20.2	—15.6	— 3.0	22.4	32.5	42.8	55.5	52.6	42.3	27.3	7.9	— 9.0	50.3
Hay River	—16.8	—10.9	1.5	26.1	41.2	51.3	61.5	58.0	45.5	31.7	7.2	— 6.0	56.9
Fort Simpson	—19.2	—17.9	— 3.2	28.2	43.0	55.5	60.2	55.7	43.5	24.8	— 0.7	—11.2	57 0
Fort Good Hope	—28.0	—21.8	— 8.7	16.9	36.7	55.1	59.1	53.5	37.7	17.0	—10.9	—21.1	55.9
Dawson City	—23.6	—12.1	5.4	27.7	45.5	57.5	60.4	54.5	41.6	24.1	— 1.5	—10.3	57.5
Peel River	—27.5	—23.3	— 7.4	7.7	28.8	51.0	57.7	53.8	36.3	13.9	—11.4	—17.7	54.2
Herschell Island	—19.0	—14.0	— 8.0	2.0	26.0	35.0	43.0	40.0	30.0	11.0	— 6.0	—15.0	39.0
Haileybury	6.4	9.0	12.1	38 3	51.3	61.5	66.2	62.3	54.4	42.5	28.1	11.5	63.3
Abitibi	1.4	2.6	14.2	32.4	46.6	58.1	64 1	60.3	51.8	40.4	24.2	7.1	60.8

TABLE II.—The average mean highest temperature.

—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fort Macleod	31·4	29·8	38·5	56·6	64·4	70·9	80·2	78·0	65·6	57·1	39·0	36·9
Calgary	23·1	24·5	35.6	53·2	62 7	68·4	74·7	70·2	63·7	55·1	36·3	30·1
Edmonton	16·7	20·3	33·8	53·1	64·8	69·9	73·8	71·8	62·2	52·9	32·8	25·3
Medicine Hat	21·8	22·7	37·2	58·5	67·9	74·6	82·4	80·9	70·0	59·0	39·1	29·8
Prince Albert	7·5	10·1	25·6	50·2	63 3	70·5	74·5	72·3	61·4	49·3	26·9	15·7
Qu'Appelle	9·0	10·2	24·6	49·3	62·5	71·7	76 6	74·7	64·2	51·2	29·7	18·0
Winnipeg	6·8	10·2	26 2	50·6	65 0	74·4	77·8	75·4	65·9	51·5	30·1	16·4
Dunvegan	2·4	16·9	32·6	52·1	64·9	70 7	75·4	71 0	60 9	43·8	24·7	8·0
Chipewyan	– 3·5	4·9	15·1	39·4	53·8	64·6	71·0	68·1	53·0	40·1	17·9	10·3
Norway House	0·6	4.2	19·3	42·7	57·4	66·4	72·1	68·6	57·1	42·4	23·8	6·6
Fort Hope	4·0	6·9	20·4	43·2	56·2	67·3	73·3	70·3	58·3	44·7	26·2	8·5
Moose Factory	7·2	11·4	23·2	37·7	51·4	66·6	72·4	69·0	61·0	47·8	28·1	13·2
York Factory												
Fort Churchill	–12·3	– 8·5	4·1	31·6	40·0	54·8	66·8	61·8	50 7	33·1	12·4	4·3
Hay River	– 8·1	– 0·1	15·1	38·4	52·7	63·0	73·5	69·7	56·5	39·7	14·6	1·5
Fort Simpson	–11·2	– 7·7	9·5	39·2	53·4	66·1	71·4	66·2	52·7	31·0	6·0	– 4·1
Fort Good Hope												
Dawson City	–16·7	– 4.3	17·5	39·9	57·1	70·5	72·7	66.1	50·6	30·9	4·5	4·5
Peel River	–18·6	–13·9	4·1	19·4	37·4	60·8	68·0	64·0	44·1	20·8	– 4·4	–10·5
Herschell Island												
Haileybury	17·6	20·4	31·4	49·8	63·2	73·3	77·0	73·1	65·1	51·3	35·0	20·6
Abitibi	13·1	15·2	26·1	41·8	55·6	66·9	72·5	68·6	59.3	47·3	30·7	16·3

TABLE III—The average mean lowest temperature.

—	Jan.	Feb.	Mar	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fort Macleod	9·1	7·2	11·8	28·7	36·8	43·7	48·8	47·7	40·4	31·9	18·3	17·7
Calgary	1·6	2·4	12·2	26·8	35·5	42·2	46·5	44·8	36·7	28·6	14·8	10·6
Edmonton	- 2·7	- 0·6	10·9	29·1	38·2	44·3	48·6	46·5	37·8	30·1	15·2	7·9
Medicine Hat	0·9	2·7	14·0	31·2	41·2	48·0	53·9	51·8	41·7	32·3	17·2	10·9
Prince Albert	-15·7	-14·2	- 0·9	24·0	35·4	44·4	49·1	45·6	36·5	26·9	8·2	- 5·6
Qu'Appelle	- 9·6	- 8·7	4·6	27·0	37·9	46·8	51·4	48·7	39·6	30·0	12·5	1·0
Winnipeg	-14·5	-13·1	3·6	27·2	38·4	49·6	53·9	50·0	41·5	30·3	11·8	- 5·6
Dunvegan	-22·0	- 8·8	7·9	24·6	34·0	41·7	47·3	45·5	34·5	23·6	9·7	-10·7
Chipewyan	-20·4	-18·7	- 5·0	17·6	35·1	43·3	51·9	48·2	37·3	27·3	4·2	- 5·9
Norway House	-19·4	-17·9	- 4·0	21·5	35·5	44·4	52·7	50·7	40·9	29·2	9·4	-10·7
Fort Hope	-17·2	-16·5	- 4·9	18·7	32·2	41·4	49·4	47·9	38·4	28·3	12·2	- 9·8
Moose Factory	-15·2	-13·7	- 3·2	17·0	31·8	43·9	50·8	48·2	42·3	32·9	14·0	- 6·5
York Factory												
Fort Churchill												
Hay River	-25·6	-21·7	-12·2	13·8	29·7	39·6	49·5	46·4	34·5	23·7	- 0·2	-13·4
Fort Simpson	-27·3	-28·1	-16·0	17·1	32·5	44·9	49·1	45·4	34·4	18·6	- 7·4	-18·4
Fort Good Hope												
Dawson City	-30·5	-20·0	- 6·7	15·6	32·9	45·2	48·1	42·9	32·5	15·9	- 7·4	-16·4
Peel River	-34·9	-32·6	-19·2	- 6·9	20·1	40·7	48·0	42·2	28·3	7·7	-17·4	-24·9
Herschell Island												
Haileybury	4·7	- 2·3	7 2	26·9	39·5	49·7	55·3	51·5	43·8	33·6	21·2	2·4
Abitibi	10·3	-10·0	2·2	23·0	37·6	49·3	55·7	52·0	44·4	33·5	17·8	- 2·1

TABLE IV.—The absolutely highest temperature in each of the various months, on record at the Meteorological Office.

—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fort Macleod	58	62	82	83	89	98	102	97	89	85	79	77
Calgary	59	59	75	78	90	94	95	95	89	85	70	60
Edmonton	57	62	72	84	90	94	94	90	86	82	74	56
Medicine Hat	62	64	75	94	94	107	108	103	93	93	78	68
Prince Albert	53	52	62	84	90	96	93	94	87	79	66	58
Qu'Appelle	44	50	65	84	92	100	100	100	91	85	73	49
Winnipeg	40	46	62	90	94	101	96	103	99	85	60	45
Dunvegan	48	52	76	75	94	87	93	90	78	70	59	46
Chipewyan	45	46	47	69	83	90	93	89	79	66	56	49
Norway House	39	36	50	75	91	89	88	90	80	75	57	38
Fort Hope	38	42	55	71	87	92	93	99	89	83	56	38
Moose Factory	40	42	57	72	88	93	97	87	91	81	62	38
York Factory	30	27	45	72	80	89	91	88	77	60	51	32
Fort Churchill	16	29	40	61	80	82	88	82	82	60	45	39
Hay River	47	48	58	74	85	95	96	90	89	72	51	
Fort Simpson	32	34	54	62	84	82	87	82	78	60	41	
Fort Good Hope	26	32	45	63	80	82	86	81	66	49	4	
Dawson City	21	29	52	67	85	90	95	86	79	62	46	
Red River	37	35	46	52	74	85	89	82	73	46	35	
Herschell Island	36	35	38	33	53	65	69	64	55	33	26	
Haileybury	48	47	71	79	93	89	99	90	91	80	67	
Abitibi	42	46	62	70	77	94	93	86	87	76	68	38

TABLE V.—The absolutely lowest temperature in each of the various months.

—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fort Macleod	-41	-49	-33	-10	5	30	37	29	20	- 4	-38	-43
Calgary	-48	-49	-34	-14	12	26	31	28	15	- 7	-31	-39
Edmonton	-57	-57	-40	-10	11	25	33	28	12	-10	-44	-45
Medicine Hat	-51	-51	-38	-16	12	31	36	32	17	-10	-36	-50
Prince Albert	-67	-70	-43	-23	13	26	33	22	14	- 8	-35	-57
Qu'Appelle	-48	-55	-45	-24	10	25	36	27	10	-12	-30	-41
Winnipeg	-46	-47	-37	-13	14	21	36	30	17	- 3	-33	-42
Dunvegan	-62	-55	-52	-27	12	17	31	23	20	- 6	-28	-47
Chipewyan	-55	-56	-41	-22	- 3	24	26	25	13	- 2	-33	-48
Norway House	-63	-54	-47	-11	12	26	32	30	14	- 2	-35	-42
Fort Hope	-54	-52	-47	-27	1	25	30	27	16	- 4	-38	-47
Moose Factory	-45	-44	-45	-21	7	23	31	34	27	12	-20	-41
York Factory	-56	-60	-51	-21	0	23	30	28	6	-16	-40	-60
Fort Churchill	-57	-52	-52	-28	-10	.....	.....	.....	15	-17	-38	-45
Hay River	-62	-59	-48	-31	-10	25	35	26	4	-10	-38	-47
Fort Simpson	-62	-54	-50	-13	- 9	27	31	24	11	- 8	-41	-49
Fort Good Hope	-72	-67	-54	-31	-11	24	34	27	- 1	-35	-52	-60
Dawson City	-68	-62	-54	-38	5	27	35	20	1	-10	-48	-50
Peel River	-68	-61	-56	-48	-10	26	32	25	5	-26	-50	-59
Herschell Island	-52	-51	-40	-29	-11	12	27	26	- 8	-16	-32	-39
Haileybury	-40	-38	-34	1	17	28	36	30	24	14	-17	-34
Abitibi	-46	-44	-42	-9	9	28	37	34	27	12	-16	-45

TABLE VI.—Showing the total average annual precipitation (rain and melted snow).

—	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Fort Macleod	0·44	0·41	0·75	0	2·00	2·20	1·80	1·35	1·14	0·48	0·68	0·37	12·17
Calgary	0·47	0·62	0·76	0	2·24	2·96	2·88	2·59	1·32	0·49	0·78	0 62	17·36
Edmonton	0·65	0·73	0·68	0	1·88	2·83	3·47	2·04	1·48	0·66	0·61	0·73	16·64
Medicine Hat	0·63	0·68	0·69	0	1·80	2·69	2·09	1·56	1·16	0·54	0·87	0·55	13·92
Prince Albert	0·89	0·73	1·00	0	1·56	2·59	2·28	2·07	1·33	0·76	0·99	0·66	15·65
Qu'Appelle	0·61	0·85	0·89		1·98	3·45	2·64	1·75	1·42	0·98	0·87	0·66	17·45
Winnipeg	0·83	0·93	1·07	1·55	2·31	3·43	3·03	2·55	2·11	1·61	1·06	0·92	21 40
Dunvegan	1·49	1·00	1·58	0·58	1·91	2·92	1·44	2·56	1·35	1·43	1·13	0·99	18·68
Chipewyan	0·86	0·55	0·66	0·64	0·72	1·57	2·53	1·84	1·47	0·75	0·87	0·74	13·20
Norway House	0·78	0·70	1·01	0·84	1·24	2·40	3·33	2·42	2·27	0·77	1·10	0·88	17·66
Fort Hope	0·80	0·50	0·70	0·23	0·95	1·78	2·28	1·81	2·28	1·02	1·06	0·80	14·21
Moose Factory	1·02	0·62	1·43	1·13	2·40	2·47	2 52	3·03	2·95	1·97	1·55	1·14	22·23
York Factory	0·63	0·35	0·40	0·83	1·13	1·90	.....	.....	2·64	1 51	0·69	0·61	
Fort Churchill	0·30	0·50	0·60	0·80	1·30	1·77	1·78	.....	.....	1·41	0·80	0·30	....
Hay River	....	....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....
Fort Simpson	0·70	0·50	0·60	0.70	3·00	2·08	1·89	1·40	1·00	1·30	1·10	1·20	15·47
Fort Good Hope	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dawson City	0 90	0·75	0·30	0·50	0·94	0·82	1·77	1·85	1·60	1·25	0·75	1·15	12·58
Red River	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Herschell Island	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Haileybury	2·17	1·99	2·29	1·74	3·08	3·42	3·80	2·81	3·51	2·83	2·29	2 37	32·30
Abitibi	1·67	1·15	2·65	1·11	2·73	2·95	2·39	2 56	2·01	2·92	2·16	2·13	26·43

F. S. Lawrence's farm, Fort Vermilion, Peace River, 58·3° north latitude, Alberta; 700 miles by trail from Edmonton.

See pages 47, 74, 78, 101 to 107.

Sheridan Lawrence's farm, Fort Vermilion, Peace River, 58·3° north latitude.

See pages 47, 74, 78, 101 to 107.

Poplars on the left side of the Athabaska River.

See pages 37, 38, 47, 48, 101 to 107.

A prairie on the Peace River.

See pages 97, 98, 101 to 107.

Potato digging on Great Slave Lake

See page 95.

Potato "Patch" at Fort Good Hope, Mackenzie River. Fourteen miles from Arctic Circle, latitude 66° 16', 970 miles north of Edmonton.

See pages 53, 55, 96.

Timber on the Athabaska River near McMurray, in the oil fields.

See pages 37, 38, 47, 48.

Flour mill at Vermilion, Peace River, 700 miles north of Edmonton, by trail ; some 400 miles due north.
See pages 37, 53, 74, 78, 101 to 107.

At Fort Providence on the Mackenzie River. Potatoes inforeground, wheat in rear. North of Great Slave Lake. Taken July 15, 1906.

See pages 46, 47, 54, 74, 75, 96.

Salt River, near Fort Smith.

See pages 39, 56.

A summer scene on the Peace River.

Oil boring machine in place, beyond Fort McKay. Latitude 56·3°, longitude 111·3°. Timber cut in locality, spruce, 18 feet by 18 inches.

See pages 37 and 38

Gas Well on the Athabaska. Drilled by A. Von Hammerstein.

See page 42.

Along the Athabaska River.

Red River carts in Northern Alberta, 300 miles north of Fort McMurray.

Spruce tree 75 feet high, 14 inches diameter, near junction of Peace and Slave Rivers.

The Chutes or Great Falls of Peace River, near Fort Vermilion.

See pages 43, 76, 79, 108, 109, 110.

Farm of Robert Jones, 58·3° north latitude, Fort Vermilion, Peace River.

See pages 37, 47, 74, 78 101 to 107.